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On Entamoeba serpentis

by

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(With plate 19).

The present paper is a supplement to earlier researches, published in a preliminary communication (see Brazil-Medico, Vol. 31, Nº 34). It deals with an *Entamoeba*, described by us, from the intestine of a brazilian snake, *Drymobius bifossatus*, which was examined for parasitic protozoa.

We have little to add to the general morphology, and only wish to give a few more particulars about the changes in the appearance of the nucleus. They are like those observed by HARTMANN in *Entamoeba testudinis* HARTMANN, and may be considered in both cases as the result of cyclic variations of the caryosome.

Though we did not give much time to the study of fresh material, we noticed some interesting facts. Live entamoeba of this species are generally nearly spheric, except when pseudopodia are formed. They move rather quickly. Their protoplasm is neatly divided in two layers: the external (ectoplasm) and the internal (endoplasm) containing inclusions, mostly of bacteria. No inclusion of red bloodcells was observed.

After fixing by sublimate-alcool (SCHAUDINN) and staining with iron-hematoxylin (HEIDENHAIN), the entamoeba shows a well marked dimorphism; the two extremes are very different, but all intermediary stages between them are found.

The first of these forms (plate 19, figs. 1, 7 and 8), is larger and its outline changeable on account of active movement. The difference between the broad external zone of hyaline ectoplasm and the alveolated layer of endoplasm is well marked. The nucleus, surrounded by the endoplasm, is vesicular, large and rounded, the central caryosome large and, as a rule, formed of several granules of chromatin, suspended in a less chromophilous stroma. The caryosome is surrounded by a large liquid zone, which, though generally structureless, may contain a few small chromatin granules, forming a continuous layer; this layer may be more developed on one side than on the other (Plate 19 fig. 1).

The other form (Pl. 19, figs. 9, 11 and 12) of the entamoeba is generally smaller,

nearly always spheric with circular outline. The protoplasm stains more intensely than in the large form. There is no clear demarcation between endo and ectoplasm; the latter is limited to a narrow periplastic layer which forms the contour of the organism. The nucleus is also spheric, with regular outline; like the rest of the cell it is reduced and smaller than in the other form. The nucleus shows a relatively large central caryosome, containing a compact mass of chromatin, generally without distinct granulations; sometimes it is attached to the nuclear membrane by fine linin threads. The caryosome is surrounded by a liquid zone, which may be structureless, or contain achromatic filaments, or chromatin granules mostly in small number. Without, at the edge of the nucleus, sometimes even adhering to the membrane, are the masses of chromatin which constitute the outer nucleus. They are large and compact, either isolated or in groups; sometimes they are grown together and form a thick chromatic ring, parallel with the nuclear membrane (Pl. 19, fig 2).

The changes in the nucleus, most of which may be interpreted as cyclic variations of the caryosome, are, as we already mentioned, one of the most striking features of this species. The following seems to us the order in which the different phases probably occur:

In the larger form there are many fine granules in the periphery of the nucleus sometimes they occupy only the part nearest to the membrane (Pl. 19, fig. 1), at others they are also found in the liquid zone (Pl. 19, fig. 7). At the edge of the nucleus these fine granules gradually melt into each other, thus forming larger ones; they are symmetrically and regularly arranged (Pl. 19, figs. 3 and 6). A fact, which seems in favour of our interpretation, is the existence of forms similar to that of fig. 7, already refered to. The greater part of the nucleus shows large granules at the very edge, while in the remaining part the granules are fine and have not yet reached the periphery. When at the edge, the granules unite and form at first larger granulations, then compact masses (Pl. 19 figs 4 and 5); at its maximum, the agglomeration looks like that shown in fig. 12.

While the granules are fusing, the caryosome, which at first always looks small, also grows larger (fig. 11). In this drawing, the large size of the caryosome seems to coincide with a beginning of desaggregation in the external chromatin. This may be previous to its expulsion, as the stages, represented in figs. 9 and 10, seem to prove.

Occasionly, we noticed a chromatin granule near the caryosome (pl. 19, figs. 3 and specially 7, 8 and 10); its meaning is uncertain, but we find that HARTMANN also noticed one in *Entamoeba testudinis*. This species has more points in common with ours, as may be seen by comparing our illustrations with his.

Sometimes there are netlike formations in the liquid nuclear zone (Pl. 19, figs. 2, 4, 6, 7 and 8). They seem more developed in the period eliminating fine chromatin granules (fig. 6). This drawing shows the achromatic network only in that part of the nucleus, in which the granules are migrating to the periphery.

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The species which comes nearest to *Entamoeba serpentis*, is the one described by HARTMANN (Memorias do Instituto Oswaldo Cruz, vol. 2, fasc. 1, pp. 3–10 Pl. 1) under the name of *Entamoeba testudinis;* but no dimorphism is seen in this species and the forms, described by HARTMANN, resemble only the larger form of our species.

Another species, found in reptilia, is *Entamoeba lacertae* (HARTMANN & PROWAZEK 1907 in Archiv f. Protistenkunde, Vol. X, p. 314, fig. 42). The authors only mention its small size and a peculiar stage in the division of the nucleus. Later on, (1914) this species was studied and fully described by DOBELL (Arch. f. Prot. Vol. 34 pp. 146–159, Pl. 8).

Explanation of Plate 19.

Fig. 1 – Large form of *Entamoeba serpentis* with an annular zone of fine chromatin granules at the edge of the nucleus.

Fig. 2 – Intermediary form between the larger and smaller ones, showing a chromatin ring, due to fusion of expelled granules.

Fig. 3 – Nucleus with granulations, due to fusion.

Fig. 4 & 5 – Formation of masses, due to the fusion of chromatin granules.

Fig. 6, 7 & 8 – Nuclei of large forms showing a network in the liquid zone.

Fig. 9 & 10 – Nuclei with desaggregating chromatic granulations.

Fig. 11 & 12 – Small forms with big caryosomes and very large chromatic masses at the periphery.

Le Microplankton des côtes méridionales du Brésil

par les

Drs. Aristides Marques da Cunha et O. da Fonseca.

Ce n'est que dernièrement, que la côte méridionale de l'Amérique du Sud e été étudiée au point de vue de la flore et de la faune de son plankton. Jusqu'à ce moment, il ny avait qu'une ou deux espèces connues, qui avaient été remarquées au courant d'autres études. Les premières observations méthodiques furent faites par GOMES DE FARIA à l'ancienne Station de Biologie Maritime et continuées plus tard à notre Institut. Leur premier résultat fut un travail sur *Glenodinium trochoideum*, qui forme un plankton monotone dans la baie de Rio de Janeiro et peut causer la mort des poissons. Ensuite, GOMES DE FARIA entreprit, en collaboration avec un de nous (MARQUES DA CUNHA), l'étude qualitative du microplankton de la baie de Rio de Janeiro. Les résultats furent publiés dans le premier fascicule du neuvième vol. des Mémoires. En trois voyages nous avons réussi à obtenir des échantillons de microplankton de la côte méridionale du Brésil et même de celle de la République Argentine. Le microplankton, provenant de l'Argentine, fut l'objet d'une étude, publiée dans le même fascicule.

Nos listes sur la constituition du microplankton de Mar del Plata (Argentine) et celles, données aujourd'hui, ne doivent être considerées que comme une première contribution à la connaissance du sujet de cette étude. Il y a encore beaucoup à faire dans les régions que nous avons explorées. Nous-mêmes n'avons pu faire une étude approfondie, faute de navires appropriés. Nous fûmes obligés à faire nos investigations du bord des bateaux, dans lesquels nous faisions le voyage, sans pouvoir profiter de tous les moyens en usage pour ces études.

Ainsi nous avons remarqué l'absence totale, ou presque totale, de représentants du genre *Chaetoceras* dans le plankton trouvé le long des côtes de Rio Grande do Sul, Santa Catharina et Paraná. A notre avis, ceci est dû à la vitesse du bateau, qui entrainait la destruction de ces organismes si délicats. Si l'on n'admettait pas cette explication, il serait très difficile de comprendre l'absence, dans cette région, d'un genre qui se trouve en si grande abondance, non seulement dans les eaux de l'Argentine, mais aussi dans une partie de la côte brésilienne, située immédia-

tement au nord. Comme nous avons indiqué antérieurement, nous n'avons trouvé qu'un nombre relativement restreint d'espèces déterminées, appartenant à certains groupes, qui pourtant étaient amplement représentés dans le plankton étudié. Pour en faire une étude détaillée, une véritable revision de tous les répresentants s'imposerait; parmi ceux-ci se trouvent les espèces du genre *Coscinodiscus*, de la classe des *Peridinées* et du groupe des *Naviculoidées*.

Coscinodiscus fut trouvé constituant un plankton presque monotone dans la baie de Paranaguá, mais seulement dans les parties les plus éloignées de l'embouchure de l'Itiberê, qui s'y jette. Les espèces observées étaient *C. excentricus* EHRENBERG et *C. radiatus* EHRENBERG. Dans le plankton recueilli au voisinage de l'embouchure il y avait beaucoup moins de *Coscinodiscus* et beaucoup plus de Copépodes, en toutes les phases de leur développement.

La perte accidentelle d'un des nos appareils nous empêcha de vérifier la cause d'un plankton rouge monotone, vu dans le voisinage de la frontière de la République d' Uruguay.

Ayant déterminé 75 espèces, dont aucune nouvelle, nous donnons une liste de leur noms, ainsi que de ceux des localités ou elles furent trouvées.

Cystoflagellés.

Noctiluca miliaris Suriray, 1836.
Port de la ville de Rio Grande do Sul, côte des états de Rio Grande do Sul et Santa Catharina.

Tintinnodées.

Codonella morchella Cleve, 1900.
Côte de Santa Catharina.

Tintinnopsis beroidea Stein, 1867.
Détroit de Santa Catharina, côte des états de Rio Grande do Sul et Santa Catharina.

Tintinnopsis campanula (Ehrenberg, 1840).
Côte de Rio Grande do Sul.

Tintinnopsis ventricosa (Clap. *et* Lachm., 1858).
Baie de Paranaguá, près de l'embouchure de l'Itiberê.

Cyttarocylis ehrenbergii (Clap. *et* Lachm., 1858), var. *adriatica* Imhof, 1886.
Baie de Paranaguá et au voisinage de l'embouchure de l'Itiberê.

Cyttarocylis ehrenbergii (Clap. *et* Lachm., 1858), var. *claparedei* (Daday 1887).
Détroit et côte de Santa Catharina.

Ptychocylis (Rhabdonella) apophysata (Cleve, 1900).
Côte de Santa Catharina.

Tintinnus ganymedes Entz, 1884.
Côte de Santa Catharina.

Tintinnus lusus-undae Entz, 1885.
Côte de Santa Catharina.

Tintinnus amphora Clap. *et* Lachm., *var quadrilineatum* Clap. *et* Lachm., 1858.

Schizophycées.

Richelia intracellularis (Schmidt, 1901).
Côte de Santa Catharina, sur des frustules de *Rhizosolenia setigera*.

Dinoflagellés.

Prorocentrum micans Ehrenberg, 1838.
Baie de Paranaguá, côte de Santa Catharina.

Prorocentrum scutellum Schroeder, 1901.
Détroit de Santa Catharina et côte de Santa Catharina.

Dinophysis ovum Schuett, 1895.
Baie de Paranaguá et détroit de Santa Catharina.

Dinophysis schuetti Murray *et* Whitting, 1899.
Côte de Santa Catharina.

Dinophysis homunculus Stein, 1883.
Côte des états de Rio Grande do Sul et Santa Catharina, baie de Paranaguá, près de l'embouchure de l'Itiberê.

Ceratocorys horrida Stein, 1883.
Côte de Santa Catharina.

Glenodinium trochoideum Stein, 1883.
Côte de Rio Grande do Sul et détroit de Santa Catharina.

Goniodoma polyedricum (Pouchet) Joergensen, 1899.
Côte de Santa Catharina.

Peridinium steinii Joergensen, 1889.
Côte de Santa Catharina.

Peridinium depressum Bailey, 1855.
Détroit et côte de Santa Catharina.

Peridinium divergens Ehrenberg, 1840.
Côtes des états de Rio Grande do Sul et Santa Catharina.

Peridinium conicum (Gran, 1900) Gran.
Baie de Paranaguá.

Peridinium pentagonum Gran, 1902.
Baie de Paranaguá, au voisinage de l'embouchure de l'Itiberê, et côte de Santa Catharina.

Oxytoxum scolopax Stein, 1883.
Côte de Rio Grande do Sul.

Oxytoxum milneri Murray *et* Whitting, 1899.
Côte de Santa Catharina.

Ceratium candelabrum (Ehrenberg) Stein, 1883.
Côte de Santa Catharina.

Ceratium furca (Ehrenberg) Clap. *et* Lachm., 1859.
Côte des états de Santa Catharina et Rio Grande do Sul et détroit de Santa Catharina.

Ceratium pennatum Kofoid, 1907.
Côte de Santa Catharina.

Ceratium belone Cleve, 1900.
Côte de Santa Catharina.

Ceratium incisum (Karsten, 1906).
Côte de Santa Catharina.

Ceratium pentagonum (Gourret, 1883).
Côte de Santa Catharina.

Ceratium hircus Schroeder, 1909.
Baie de Paranaguá et voisinage de l'Itiberê.

Ceratium fusus (Ehrenberg, 1833) Dujardin, 1841.
Côte des états de Rio Grande do Sul et Santa Catharina et détroit de Santa Catharina.

Ceratium tripos (O. F. Mueller, 1777).
Côte de Rio Grande do Sul et de Santa Catharina et détroit de Santa Catharina.

Ceratium gibberum Gourret, 1883.
Côte de Rio Grande do Sul et de Santa Catharina.

Ceratium gibberum Gourret, 1883, forma *sinistrum* Gourret, 1883.
Côte de Santa Catharina.

Ceratium palmatum (Schroeder, 1900) Schroeder, var. *ranipes* (Cleve, 1900).
Côte de Santa Catharina.

Ceratium massiliense (Gourret, 1883).
Côte de Santa Catharina.

Ceratium trichoceros (Ehrenberg, 1859) Kofoid, 1908.
Côte de Santa Catharina.

Ceratium reticulatum (Pouchet, 1883) Cleve.
Côte de Santa Catharina.

Podolampas palmipes Stein, 1883.
Côte de Rio Grande do Sul et Santa Catharina.

Podolampas bipes Stein, 1883.
Côte de Santa Catharina.

Silicoflagellés.

Dictyocha fibula Ehrenberg, 1839.
Côte de Santa Catharina.

Diatomacées.

Melosira borreri Greville, 1856.
Détroit de Santa Catharina et baie de Paranaguá, près de l'embouchure de l'Itiberê.

Paralia sulcata (Ehrenberg, 1837) Cleve.
Détroit de Santa Catharina et baie de Paranaguá, près de l'embouchure de l'Itiberê.

Skeletonema costatum (Greville, 1866) Cleve.
Côte de Rio Grande do Sul et Santa Catharina, détroit de Santa Catharina, baie de Paranaguá et au voisinage de l'embouchure de l'Itiberê.

Leptocylindrus danicus Cleve, 1889.
Côte de Rio Grande do Sul et baie de Paranaguá, près de l'embouchure de l'Itiberê

Guinardia flacida (Castracane, 1886) Peragallo.

Baie de Paranaguá et au voisinage de l'embouchure de l'Itiberê.

Coscinodiscus excentricus Ehrenberg, 1839.

Baie de Paranaguá.

Coscinodiscus radiatus (Ehrenberg, 1839).

Baie de Paranaguá et au voisinage de l'embouchure de l'Itiberê.

Actinoptychus undulatus (Bailey) Ralfs, 1842.

Baie de Paranaguá près de l'embouchure de l'Itiberê.

Rhizosolenia stolterfolthi Peragallo, 1888.

Baie de Paranaguá et au voisinage de l'embouchure de l'Itiberê.

Rhizosolenia schrubsolei Cleve, 1881.

Détroit de Santa Catharina.

Rhizosolenia setigera Brightwell, 1858.

Côte et détroit de Santa Catharina; baie de Paranaguá et voisinage de l'embouchure de l'Itiberê.

Rhizosolenia calcar-avis Schultze, 1858,

Baie de Paranaguá et détroit de Santa Catharina.

Rhizosolenia alata (Brightwell, 1858) forme *genuina* Gran, 1911.

Côte de Santa Catharina.

Rhizosolenia alata (Brightwell, 1858) forme *gracillima* Cleve.

Côte de Santa Catharina.

Rhizosolenia alata (Brightwell, 1858), forme *indica* (Peragallo, 1892).

Baie de Paranaguá.

Corethron criophilum Castracane, 1886.

Baie de Paranaguá près de l'embouchure de l'Itiberê.

Bacteriastrum furcatum Schadb., 1854.

Côte et détroit de Santa Catharina.

Chaetoceras schuettii Cleve, 1894.

Baie de Paranaguá et voisinage de l'embouchure de l'Itiberê.

Chaoetceras subtile Cleve, 1896.

Détroit de Santa Catharina et baie de Paranaguá.

Cerataulina bergonii Peragallo, 1892.

Côte de Rio Grande do Sul.

Biddulphia biddulphiana (Smith) Boyer, 1809.

Baie de Paranaguá près de l'embouchure de l'Itiberê.

Biddulphia mobiliensis (Bailey) Gruen., 1859.

Côte de Rio Grande do Sul, baie de Paranaguá et voisinage de l'embouchure de l'Itiberê.

Biddulphia sinensis Grev., 1866.

Côte de Rio Grande do Sul, détroit de Santa Catharina, baie de Paranaguá et au voisinage de l'Itiberê.

Biddulphia rhombus (Ehrenberg) W. Smith, 1844.

Détroit de Santa Catharina.

Biddulphia favus (Ehrenberg, 1839) V. Heurck.

Côte de Rio Grande do Sul, détroit de Santa Catharina et baie de Paranaguá, près de l'embouchure de l'Itiberê.

Biddulphia vesiculosa (Ag.) Boyer, 1824.

Détroit de Santa Catharina.

Bellerochea malleus (Brightwell), V. Heurck, 1858.

Baie de Paranaguá près de l'embouchure de l'Itiberê.

Lithodesmium undulatum Ehrenberg, 1840.

Baie de Paranaguá et au voisinage de l'embouchure de l'Itiberê.

Ditylium brightwelli (West, 1860) Gruenow, 1858.

Baie de Paranaguá.

Thalassiothrix nitzschioides Gruenow, 1862.

Côte des états de Rio Grande do Sul et Santa Catharina, détroit de Santa Catharina, baie de Paranaguá et près de l'embouchure de l'Itiberê.

Nitzschia closterium W. Smith.
Baie de Paranaguá et au voisinage de l'embouchure de l'Itiberê.

Bacillaria paradoxa Gmelin.
Baie de Paranaguá et au voisinage de l'embouchure de l'Itiberê.

Report on the journey down the river Paraná to Assuncion and the return journey over Buenos Aires, Montevideo and Rio Grande

made by

Dr. Adolpho Lutz, Dr. H. C. de Souza Araujo and Dr. O. da Fonseca.

From January to March 1918.

(With Plates.)

Summary of the diaries of Drs. Lutz and Araujo.

(Inset numbers refer to illustrations.)

In the beginning of the year, a journey down the river Paraná was made at the expense of the government of Paraná and the Instituto O. CRUZ by Drs. ADOLPHO LUTZ, HERACLIDES DE ARAUJO and O. DA FONSECA jun. Photographs were taken by Drs. ARAUJO and FONSECA. The commission started from São Paulo, stopping first at Baurú[1-2], then at Itapura where they saw the celebrated falls of the river Tietê[3,4] and soon reached the Paraná[5], staying in Tres Lagoas on the Matto Grosso bank. There began the journey on the Upper Paraná which, though very wide, was hardly known until a few years ago; even now, its banks are only very sparsely inhabited. The medical commission embarked on a small steamer, the Paraná[6], which took them to Porto Tibiriçá[7-10], a settlement of the Companhia de Viação São Paulo Matto Grosso with extensive pastures, in which the cattle, transported from Matto-Grosso on the opposite bank, may rest. From Porto Tibiriçá they went downstream[11-31] to Porto Mojoli[32-43] in a barge towed by a gazoline launch belonging to the Empreza Matte-Larangeira. Porto Mojoli is a settlement of the same Company, above the celebrated falls of the Paraná, called Salto Guayra or Sete Quedas. Enormous quantities of Matte brought from Matto Grosso are sent by rail from this place to Porto Mendes[46] where the river again becomes navigable. After having been the guests of the Empresa for some time and making several excursions[44,45] the travellers proceeded to Porto Mendes[46] and went on board one of the steamers of the regular service on the Lower Paraná[47].

They next stopped at the military settlement and colony Iguassú[48-58], one of the remotest points of the southern frontier of Brasil which is still very difficult to reach by land. Near it, they saw the cataracts of the Iguassú[59-66] river. These belong partly to the argentinian Missiones, partly to Brazil. There are more visitors on the argentinian side but the scenery is finer when seen from the brazilian bank. There are small hotels on both sides. The commission stayed for some

time in the Brazil Hotel and explored the place which seems destined to become a center of great attraction. They also visited Porto Bertoni[67] on the Paraná, the residence of a Swiss naturalist, Dr. BERTONI, who has spent most of his life in Paraguay.

From Iguassú the travellers descended the Paraná on the *España*[49], passing the mouth of the Iguassú[66] where Argentine, Brazil and Paraguay meet. From here downwards the right bank is paraguayan while the left belongs to the argentinian Missiones. Owing to the facilities of steam navigation, there are many settlements[68] where timber is felled and shipped. Between them, the forest is still unbroken. Only near Encarnacion and Posadas the shores become gradually more cultivated, while the river broadens to a width of 4 kilometers. Posadas, on the argentine shore, is the capital of the Missiones and Encarnacion on the opposite bank is an important paraguayan port, connected by railway with the capital, Assuncion. Both are rising places.

After a visit to Posadas[69a] and a short stay in Encarnacion[69], the travellers went by rail to Assuncion[70-73] where they were very kindly received by the authorities and the physicians. With Dr. MIGONE, the director of the bacteriologic Institute, they went to San Bernardino on lake Ipacarahy[74] and visited the remainders of the Rio Salado[75], where there is a focus of Mal de Cadeiras (equine trypanosomiasis). They also visited the Botanical Garden in Trinidad[76-78], where they saw interesting plants and various colections and made studies in the hospitals and the bacteriologic institute. After a pleasant evening, spent with the doctors of Assuncion, they embarked for Buenos Aires on the large river-steamer Bruxellas, descending first the Paraguay[79], then the Paraná. They stopped at many ports, some of them belonging to important towns[80]. After three days journey they arrived in Buenos Aires[81-82] where they stayed several days and returned to Rio by water, first visiting Montevideo. They stopped several days in Rio Grande[83-87] but barely touched Florianopolis[89], Itajahy[99], São Francisco[100-101], and Paranaguá. Dr. ARAUJO however stayed in the city of Rio Grande[95-98] and visited several places[88-94] in the same state before returning to Rio.

Entomological, zoological and botanical notes by Dr. Adolpho Lutz.

1. Insects observed on board while travelling.

While travelling during many days and by various crafts on the Paraná and its afluents, I was able to make some entomological observations, the results of which, combined with others obtained under similar conditions, are not altogether devoid of biological interest.

In day-time, few insects are seen on the larger rivers. Those met with are mostly butterflies which attempt to cross the river, either isolated or in bands, as some *Pieridae* for instance. They seldom settle on board. Most of them keep near the banks where they can be seen on wet spots or at rest on canoes and barges moored there. One kind of *Libythea* seemed to prefer the deck of barges to any other resting place and gathered there in large numbers. The same may be said of some large *Hymenoptera.*

In the woods bordering the rivers, *Coleoptera* must be plentiful but only a few isolated specimens are seen flying over the water.

Some *Tabanidae* follow the rivers and invade the boats even in broad daylight, as for instance *Lepidoselaga lepidota* and two kinds of *Diachlorus: flavitaenia* and *bimaculata*, generally easily distinguished but showing forms of transition. These species are never found far from the rivers where their breeding places must be looked for. The larvae are still unknown, like those of some species of *Esenbeckia*, which also acompany the river though they do not favour broad daylight. *Chelotabanus aurora*, a decidedly fluviatile species, is seen at dusk. Like *Lepidoselaga*, it is also found on the rivers of northern Brazil.

When the boats are at a good distance from the shore, mosquitos are not seen in daytime. At twilight and at night, some species, chiefly of *Mansonia* and *Cellia*, are attracted by the lights and may appear on board, but they are not nearly so numerous as when the boat is near to, or moored at the bank.

Several kinds of *Simulium* apparently like following rivers where the air is always damp. Sometimes they are found up to thirty miles from their breeding places; I had already noticed this on the São Francisco river, and observed it again on the Paraná. *Simulium amazonicum* is found on all the large rivers, where there are falls, and is most annoying when one travels by water. On shore, horses are more persecuted than their riders.

In the ports some flies belonging to the *Anthracidae* and *Muscidae* groups came on board, while others bred there or were shipped with goods.

At night, many more insects appear, specially when the boats are well lit. On dark nights they are more numerous but generally small in size. The moths are mostly small and *Microlepidoptera* prevail. The diptera are chiefly small *Nematocera* with aquatic larvae, specially *Chironomidae*. When the river winds through marshy regions, their number increases considerably. *Trichoptera* and *Neuroptera* with aquatic larvae are also found in many individuals, but in few species. Most of them are *Plecoptera* of the genus *Perlodes*; *Ephemeridae* appear ocasionally, while some species of *Trichoptera* are more regularly observed. I noticed a *Leptonema* and another one, which probably belongs to a new genus of *Macronematinae* (*Hydropsychidae*). A goodly number of brazilian *Trichoptera* is already known but there must be many more. Their preservation is difficult, as the body is very soft while the antennae are fragile and often extremely long.

Unlike the clear streams coming from the mountains, the turbid waters of large rivers, depositing quantities of mud, are unfavourable media for aquatic larvae and only a small number of species have adapted themselves to them, though there may be many individuals. They are of practical interest as food for fishes but their study must be left for the future.

Where many insects appear, spiders are always found and this is true even on board ship.

2. Blood-sucking Diptera.

Acording to all accounts, the summer of 1917—18 was unfavourable for the collecting of insects in the regions of the Paraná and of Paraguay through which we passed. This was due to a spell of dry weather just before the summer and to a great frost in winter, which was still indicated by the large number of dry branches hanging on the trees. To add to this, the best season was already over and we were only able to collect on river banks or on board ship. In spite of these difficulties, we collected and preserved about 600 insects, besides many which were not mounted. We did not find many new species but made some interesting observations on the distribution of hematophagous diptera. Partly for this reason and partly on acount of its practical interest, I shall deal with this group first, beginning with the Culicidae.

Culicidae.

Anophelinae. Of this sub-family, we only found two kinds of *Cellia*. One was *C. argyrotarsis* which must be considered the transmissor of malaria among the inhabitants of the Upper Paraná and the crews of boats who spend the night in foci of infection. Some specimens were caught in Porto Tibiriçá and many others were captured on board the launch, on an excursion to the Ivahy river. Of *C. albimana*, only a few specimens appeared on the Upper Paraná. At the time the river was high and the conditions unfavourable to the breeding of these mosquitos; as it happens on other rivers, many more might have been found at a different period. In any case the intervention of other mosquitoes is not necessary to explain the presence of malaria in this region.

Culicinae. We found *Stegomyia* (the transmissor of yellow fever) in Baurú and also in large numbers in Tres Lagoas (Matto Grosso), the first station on the Corumbá railway. If the other stations on the same line are not already invaded by *Stegomyia*, it is safe to say that they will soon be, as this mosquito is easily spread by railway. In the ports Tibiriçá, Mojoli, Mendes and in Iguassú we found no *Stegomyiae.* They are only seen when imported, as they are not natives of that region. I saw them again in Encarnacion, Assuncion and San Bernardino and on the earlier part of the journey. *Stegomyia* is found in Buenos-Aires, La Plata and Montevideo. I am not sure whether it occurs in Rio Grande or not. Only once during my stay did I see a mosquito flying in the peculiar way which characterises the male *Stegomyia.*

The most troublesome Culicidae met with on the journey were:

Culex fatigans (nowadays *quinquestriatus)*
Culex confirmatus (nowadays *scapularis*)
Culex albofasciatus MACQ.
Ianthinosoma Arribalzagae
Mansonia titillans

The common night-mosquito, *C. fatigans* WIED., is so ubiquitous that is hardly seems worth mentioning in which places we found it.

C. scapularis ROND., more known as *C. confirmatus*, is very common on the Upper Paraná. In houses or boats in motion it is not numeousr, but as soon as the latter come alongside the bank, *C. scapularis* invades them, together with *I. Arribalzagae.* It is however only when one penetrates into the depths of the thickets on the shore, that the former becomes really unbearable. Strange to say, the larvae of this species are seldom found. This fact and the frequent occurence of rubbed specimens lead me to believe that *C. scapularis* enjoys a long life. We did not find a single breeding place of the larvae of this species, during the whole of the journey.

From Iguassú to Encarnacion, mosquitos are, generally speaking, more rare; *C. scapularis* is however frequently found in Paraguay and in the Argentine, where there are trees.

C. albifasciatus ressembles *C. scapularis* in many ways. It atacks in day-time, even in full sun-light and its bite is rather painful. When attracted by artificial light, it enters houses and boats in great numbers; yet it can hardly be considered a house mosquito. The first specimens were found below Corrientes; while crossing a marshy region below Paraná, the boat was completely invaded by *C. albifasciatus.* Until a short while ago, this species was only known from the Argentine, but I found it very abundant in the harbour of Rio Grande where it came on board. I caught several females, some of which were gorged with blood; others I allowed to sting. The eggs obtained from them were laid separately and of the same shape as those of *Stegomyia.* They sink easily, but develop even under water, though less quickly. The larvae take at least five days to develop; they have a short and stout respiratory tube and, after the last moult, about fourteen curved compound spines on each comb. These are generally almost equal but the basal one is shorter and the two last ones longer; the tuft corresponding to each comb is composed of nine bristles and is nearer to the apex. The antennae are short and have no bristles. The larval stage lasts about two weeks; many of our larvae died, problably because the conditions under which they were raised were defective and different to the normal ones. The nymphal period is a litle less than three days.

We found regular swarms of *Ianthinosoma Arribalzagae.* It is not wanting on the Lower Paraná and in Paraguay, while on the upper river and its affluents, above Porto Mojoli, it formed a real line of defense, attacking all the people who went on shore and invading the boats lying alongside. In some places the number of females settling on the travellers' clothes surpassed anything I had hitherto seen, but luckily only a few of

them were able to bite. When one penetrates deeper into the woods, found on the banks of all the rivers, their number decreases rapidly while that of *C. scapularis* increases. *I. Arribalzagae* is found exclusively on the banks of rivers in which the musty breed, as often there is no other water in the neighbourhood. I did not succeed in obtaining any larvae and believe that they either live in deep water, or cling to plants. At the waters edge grew a continous fringe of *Eichhornia*, but their immersed parts were covered with mud and we found no larvae on them. I got many eggs of *I. Arribalzage*; they were isolated, black and like those of *Stegomyia* in shape. Unfortunately, though I made repeated and prolonged experiments under varying conditions, no larvae were hatched; this points to very peculiar biologic conditions. The period of incubation is probably very long.

Some specimens of this gnat were quite typical but others seemed to form a transition to *I. albigenu*, of which we also found characteristic specimens. *I. albigenu* is probably only a variety ot *I. Arribalzagae.*

The other two species of *Ianthinosoma* are comparatively rare, evidently because they require different conditions.

I found *Mansonia titillans* both on the upper Paraná (Tres Lagoas, Porto Tibiriçá and Mojoli and between these places) and on the lower part of the river. It often came on board at dusk. *M. titillans* is common on the Salado river near San Bernardino (Paraguay). In the earlier part of the journey we saw many specimens with reddish scutum, which must be a variety; typical specimens, with brown scutum, appeared further South.

On the Upper Paraná, I found two specimens of a *M.* species I had already seen on the San Francisco and in Pernambuco, where I found its larvae onthe roots of *Pistia stratiotes*. Perhaps it was *M. pseudotitillans*, which is very common on the Amazon. On this journey, we only saw a few specimens of *P. stratiotes* and those I examined had no larvae on them. *Taeniorrhynchus* species were conspicuously rare during the whole journey.

Psorophora ciliata came on board several times, both in the Upper and on the Lower Paraná. It is common enough in Paraguay, and Dr. MIGONE collected three color varieties of it near the river Salado. On an excursion to this river, made with him, we also found the three varieties. Besides the typic form, there is an ochraceous one and an almost black one, which must not be mistaken for *Ps. Holmbergi*. The latter is restricted to a small zone; we caught only one female that came on board below Paraná.

In the Iguassú falls, I noticed some *Culex serratus* and one specimen of *C. crinifer*. Wood mosquitos breeding in *Bromeliae* were rare because there were few of these plants, and those not in favorable conditions; at Iguassú only, did I obtain some larvae, but they were not very interesting. Some of the places we passed were covered with *Chusquea gaudichaudi* and would be very suitable for studying the fauna of this giant bamboo. Unfortanately they had flowered the year before and in consequence were dead. Between Porto Mojoli and Porto Mendes, we found a few living ones, from which I bred *Carrolia iridescens* and *Hyloconops longipalpis*. There were also some larvae of *Sabettinus* and *Megarrhinus* but they died on the journey.

In the same woods grew a great many specimens of *Urera subpeltata* MIQ (?), the stems of which sometimes hold water. Dr. ARAUJO and I picked and examined many of them, but all we found was one larva of the *Dendromya* type. We did not succed in raising it, so the species remains uncertain. We intend to investigate this point at the earliest opportunity.

Chironomidae, subfm. Ceratopogoninae.

Some small blood-sucking *Ceratopogoninae* with spotted wings, generally known as "*mosquitos polvora*", or "*polverinos*" and belonging to the genus *Culicoides*, were

found in Porto Tibiriçá, Porto Mojoli, on the river Pequery and at the Iguassú falls. They enter houses, specially open verandahs. All specimens probably belonged to the same species, described in my monograph as *C. debilipalpis*. Dr. MIGONE also found them in Porto Bertoni. I found the first larvae of wood Culicoides discovered in South America, in some rain water which had gathered in the bark of a felled tree in Iguassú, but unfortunately I did not succed in raising them. Dr. MIGONE gave me some "polverinos" of another species, *C. horticola* LUTZ, in Paraguay. It seems that *Cotocripus pusillus* is also found. The distribution of the genus *Culicoides* is rather hap-hazard, but the species, of which there are few, range over great stretches of land.

Simuliidae.

The larvae of the *Simuliidae* or black-fiies, of which there are some twenty or thirty species in Brazil, live in running water or in falls. Only a few kinds are found in the larger rivers, which always carry and deposit great quantities of mud; there are not many even in the rapids and falls, but some of them attack man.

The best time for studying them is when the river is low. Now, during our journey the river was high and made the gathering of *Simulium* in its first stages very difficult. Only at great cost did I obtain a few larvae and pupae above the Guayra falls.

Three species of *Simulium*, all of which attack man, were described by Mr. SCHROTTKY from Paraguay. Believing them to be new, the author named them: *S. inexorable*, *S. paraguayense* and *S. paranaense*. As I already suggested, the first is synonymous with *pertinax* KOLLAR, the most common species of Rio de Janeiro. *S. paraguayense* agrees with specimens I have since determined as such. As for *paranaense*, I found no species that could be considered as undoubtedly the same.

S. pertinax is quite common all along the mountainous coast of Brazil, from Sta. Catharina to Bahia, though only on the lower mountains. I never saw it more than 800 m. above sea-level. Large colonies of its larvae and pupae are found on the more horizontal ledges of rock in the falls of mountain streams and brooks, for instance near Rio above the Cascatinha (Tijuca), on the Gavea and in the Serra da Estrella. Inland the same species occurs at moderate elevations, e. g. on the Tocantins, the Paraná and the Paraguay.

I found *S. paraguayensis* in and near the river São Gonçalo (Lassance, Minas), in the Rio Grande (which flows into the Paraná), at the great fall of the Paranapanema and in sundry other falls. It also seems frequent in Tucuman. SCHROTTKY says that on the Upper Paraná it is common, though never seen at any distance from the river. In the woods near Iguassú, I saw swarms of *S. paraguayense*; only a few of them would bite but they were very annoying. Fortunately, the irritation produced is less painful and of shorter durationythan that caused by *S. pertinax*.

Though, I know the nymphae of *S. paraguayense*, I did not find any on this journey, a fact doubtlessly due to their being covered by the flood. Under these circumstances, the presence of such a large number of adults points to great longevity.

Besides these, I found two other species, only one of which, the "*piúm*" of North Brazil (*S. amazonicum*), attacks man; a few specimens were caught at the Iguassú falls. The other, *S. orbitale*, (so named because it prefers to sting horses at the orbital margin, though it attacks other parts of the body as well), we met on the Upper Paraná in Porto Mojoli and just above the cataracts of Guayra in which it must breed. We gathered the very characteristic larvae and nymphae above the Iguassú falls. They are generally found in all large falls such as those of Pirapora, Paulo-Affonso, Avanhandava etc. Up to now, this species is the only one found in the two

first mentioned. It is unusual for them to be directly fixed on stones; as a rule they are attached to plants, principally to *Podostemaceae* which only grow in falls. In its earlier stages *S. amazonicum* also lives on them.

Lately, I received the following species from Dr. MIGONE, who collected them in Puerto Bertoni, long after I had left:

1. *Simulium pertinax* KOLLAR.
2. *Simulium orbitale* LUTZ.
3. *Simulium paraguayense* SCHROTTKY
4. *Simulium amazonicum* GOELDI.
5. *Simulium subpallidum* LUTZ.

From Prof. WOLFFHUEGEL I received:

1. *Simulium pertinax* (from Puerto Aguirre).
2. *Simulium rubrithorax* (from BONPLAND).

Simulium subviride n. sp. was not rare in Puerto Mojoli; I caught it on horses. *S. incrustatum*, a rather common kind, came on board between Porto Mojoli and Porto Tibiriçá.

Psychodidae.

The only specimen of *Phlebotomus*, seen on this journey, was caught after dark in a wood near Iguassú by the light of a lantern. It was a female of *Ph. longipalpis*, a species which also occurs in Paraguay, from where Dr. MIGONE kindly sent me some specimens.

3. Faunistic distribution of Tabanidae.

I have made a great many observations on the very complex distribution of South-American Tabanidae. Not only is it independent of politic frontiers, but almost even of geographic ones. The widest rivers do not oppose a real barrier, and the Andes are the only chain of mountains which separate different faunae almost completely.

Some species are common in Brazil and also in the neighbouring countries, while others appear sporadically in places separated by great distances; most of them however have centers from which they radiate over a limited area, near which they are then substituted by other closely allied forms. Mean temperature and vertical elevation are important factors in the distribution of Tabanidae; there is also a marked difference between the mostly wooded coast and the campos found inland.

But for the above mentioned common and widely distributed species, the fauna of the Northern States is quite different from that of the middle regions and of the South. On this journey we found the fauna of the two latter regions and chiefly the species living inland, as well as the ubiquitous forms. During the best part of our travels, I only collected on board or at the river side without the help of horses; only in Porto Tibiriçá, Porto Mojoli, in Iguassú and Paraguay, between San Bernardino and the Salado river, did we have horses or mules.

Among several hundred collected specimens there was only one male. In the earliear days of our travels we had much rain. The season was favourable for most kinds but it was already late for some, so that our catalogue of about 25 species is far from complete.

Follows a list of Tabanidae with indications of the places in which they were caught (species characteristic of the local fauna, in italics):

Tabanidae from the region round Porto Tibiriçá.

1. *Erephopsis xanthopogon*
2. *Esenbeckia Clari*
2a. *Esenbeckia Clari* var. *nigricans*
3. Selasoma tibiale
4. *Lepidoselaga lepidota*
5. *Diachlorus bimaculatus*
6. *Chlorotabanus mexicanus*
7. Odontotabanus aurora
8. *Macrocormus sorbillans*
9. Neotabanus ochrophilus
10. *Neotabanus triangulum*
11. *Neotabanus comitans*
12. Leucotabanus leucaspis

Porto Mojoli region.

1. *Erephopsis ardens*
2. Chrysops costatus
3. Chrysops leucospilus
4. *Diachlorus flavitaenia*
5. Cryptotylus unicolor
6. *Odontotabanus aurora*
7. *Odontotabanus cinerarius* (with blackish wings)
8. *Phaeotabanus limpidapex*
9. *Phaeotabanus aphanopterus*
10. *Tabanus cayennensis* (seen, not caught)
11. Macrocormus sorbillans
12. *Catachlorops intermedius*

Puerto Bertoni (Paraguay).

I saw the following species in the collection of Mr. A. DE WINKELRIED BERTONI.

1. *Erephopsis ardens*
2. *Epipsila eriomeroides*
3. *Esenbeckia* nov. spec.
4. Dichelacera alcicornis
5. *Odontotabanus fuscus*
6. Neotabanus ochrophilus
7. *Macrocormus trizonophthalmus*

Iguassú region.

1. *Erephopsis ardens*
2. *Catachlorops intermedius*

Paraguay (Assuncion region).

1. *Erephopsis ardens*
2. *Erephopsis marginata*
3. *Chrysops parvifascia*
4. *Dichelacera modesta*
5. *Tabanus importunus*
6. Neotabanus ochrophilus
7. Neotabanus triangulum
8. Leucotabanus leucaspis
9. *Diachlorus bipunctatus*
10. *Pseudacanthocera marginata*
11. *Tabanus interpunctus* n. sp.
12. *Tabanus monogramma*
13. *Tabanus fuscofasciatus* var.
14. Chlorotabanus mexicanus
15. *Macrocormus pseudosorbillans*
16. Poecilosoma quadripunctatum
17. *Chrysops costatus*
18. *Chrysops crucians*
19. *Chrysops laetus*
20. Chrysops leucospilus
21. *Chrysops nigricorpus*
22. *Chrysops parvifascia*

The first eight species were collected between San Bernardino and the river Salado, in March; the others were determined from specimens gathered by Dr. MIGONE before that date. I believe that I saw *Tabanus cayennensis* as well, and I observed *Poecilosoma quadripunctatum. Lepidoselaga albipes* and *Dichelacera trigonotaenia* are also found in Paraguay.

I have published a note on the Tabanidae of the North West of São Paulo and of Matto-Grosso, in our Memorias.

After my return to Rio, I received some further collections, which, with other earlier ones from the same places, augment the lists of these local faunae.

Follows a list of:

Tabanidae from Missiones.

Collected by VAN DE VENNE and sent by Prof. WOLFFHUEGEL:

1. *Erephopsis ardens* – Porto Aguirre, river Iguassú and Bonpland.
2. *Pseudoscione longipennis* (RICARDO) – Missiones.
3. Chrysops costatus – Bonpland.
4. Chrysops fusciapex – Bonpland.
5. *Diachlorus flavitaenia* – Paraná river.
6. *Tabanus fuscofasciatus* – Bonpland.
7. Poecilosoma quadripunctatum (F.) – Bonpland.
8. Leucotabanus leucaspis – Bonpland.
9. *Leucotabanus ocellatus* n. sp. – Missiones.
10. Chelotabanus aurora – Iguassú, falls; Porto Aguirre.
11. *Stictotabanus conspicuus* – Missiones.
12. *Catachlorops intermedius* – Missiones.
13. *Dicladocera macrospila* – Missiones.

To these we may add some species described by MACQUART with the mention "Du

territoire des Missiones". Some must belong to a part of the Missiones with a very different fauna.

14. *Tabanus fenestratus* – MACQUART
15. *Tabanus angustus* «
16. *Tabanus missionum* «
17. *Tabanus Hilarii* «
18. *Tabanus trigonophorus* «

Tabanids from Uruguay, sent by Mr. JUAN TREMOLERAS.

1. *Tabanus (Macrocormus) rubescens* BIGOT.
2. *Tabanus fuscofasciatus* MACQ.
3. *(Neotabanus) pungens* WIED. syn. *comitans* WIED.
4. *Neotabanus dorsiger* WIED.
5. Neotabanus triangulum WIED.
6. Neotabanus trivitatus F.
7. *Neotabanus ornatissimus* BRETHES.
8. *Neotabanus angustus* MACQ.
9. *Neotabanus missionum* MACQ.

Previously obtained species:

10. *Chrysops uruguayensis*
11. *Dichelacera trigonotaenia*
12. *Neotabanus angustus*
13. *Neotabanus bonariensis*
14. *Neotabanus missionum*
15. *Neotabanus trigonophorus*

Tabanus pictipennis described by MACQUART from Maldonado is not represented in our collections.

Most of these species are found in the neighbouring countries as well.

To facilitade the comparative study of the Tabanidae, I give lists of those found in the other southern states of Brazil; they are from collections seen or made by me.

State of Rio Grande do Sul:

1. *Erephopsis marginalis.*
2. *Erephopsis ardens* (*S.* Leopoldo – MACQUART).
3. *Dichelacera lacerifascia*
4. *Dichelacera multiguttata.*
5. *Dichelacera trigonotaeniata*
6. *Dichelacera unifasciata*
7. *Dichelacera alcicornis*
8. *Poecilosoma histrio*
9. *Poecilosoma monogramma.*
10. Poecilosoma quadripunctatum
11. *Dicladocera macrospila*
12. Dicladocera guttipennis
13. Dicladocera potator
14. *Macrocormus sorbillans*
15. *Neotabanus angustus*
16. *Neotabanus bonariensis*
17. *Neotabanus missionum*
18. Neotabanus triangulum
19. *Neotabanus trigonophorus*
20. *Neotabanus ochrophilus*
21. Chelotabanus impressus
22. Chrysops crucians
23. Chrysops leucospilus

State of Santa Catharina.

The Tabanidae from Santa Catharina, which I have, are mostly from a small collection made by me in São Bento or from a larger one, made by Dr. PINTO GUEDES along the coast. They came from wooded mountainous regions and are like those from the corresponding regions of São Paulo, Paraná, Matto Grosso and Rio de Janeiro.

I found only two new species but also some rare or undescribed ones, as will be seen from the following list:

1. *Erephopsis sorbens*
2. *Erephopsis aurimaculata*
3. *Erephopsis incisuralis*
4. Chrysops laetus
5. Diachlorus bivittatus
6. *Diachlorus flavitaenia*
7. *Stigmatophthalmus altivagus*
8. *Acanthocera longicornis*
9. *Acanthocera eristalis*
10. *Acanthocera nigricorpus*
11. Dichelacera alcicornis
12. *Catachlorops intermedius*
13. *Catachlorops praetereuns*
14. Catachlorops rufescens
15. Amphichlorops flavus
16. *Rhabdotylus planiventris*
17. *Dicladocera furcata.*
18. *Dicladocera macula*
19. *Dicladocera potator*

20. *Dicladocera rufipennis*
21. *Poecilosoma quadripunctatum*
22. *Leucatabanus nigristigma*
23. *Neotabanus triangulum*
24. *Odontotabanus impressus*
25. Chlorotabanus mexicanus
26. Stictotabanus conspicuus n. sp.
27. *Leptotabanus nigrovenosus*
28. *Stibasoma Willistoni*
29. *Stibasoma semiflavum*
30. *Poecilosoma punctipenne*
31. *Erephopsis nigricorpus*
32. *Dichelacera rubricosa*

Coast and mountains of the coast of Paraná.

The Tabanidae found on the coast and its mountains belong to a fauna which extends from São Paulo to Santa Catharina. To prove this statement I give a list of a few species from my collection:

Erephopsis sorbens
Chrysops costatus
Stibasoma Willistoni
Rhabdotylus planiventris
Catachlorops intermedius
Poecilosoma punctipenne
Poecilosoma quadripunctatum.

4. Zoology notes.

Mammalia: The *ariranha* (*Lutra paranaensis)* is probably the most characteristic mammal of the brazilian part of the Paraná river. We saw several specimens of it while travelling and observed a very tame young female in the hotel of Porto Tibiriçá. We also met several bands of *Capivaras (Hydrochoerus capibara)*; they are best seen from the river as they are amphibious in their habits.

We crossed extensive stretches of quite unhabited land (*sertão*) where all the primitive fauna still exists. Most mammals are rarely seen, but spoors and other indications of them are frequent on the river shores. The *anta* (*Tapirus americanus*) is still common on the Paraná and its affluents, and in the campos of Matto Grosso the big stag (*Caryacus paludosus*) is quite at home. The large *armadillo* (*Priodontes giganteus*) may be traced by its large burrows. Once we enjoyed the rare side of seeing a slate blue *armadillo (Tatus novemcinctus — tatú azul)* swimming across a pretty wide river. Another time we saw a *coati,* (*Nasua socialis*), drifting down the Paraná on a dead branch until it was swallowed by one of the whirlpools. At Iguassú we were given a small hare (*Lepus brasiliensis)* quite common there.

In the woods near the Iguassú falls we saw one or two *cotias (Dasyprocta* spec.). These and a few bats, caught in a cave, bring the list of mammals observed by us to a close.

We saw no monkeys, of which there cam be but few species in the woods we crossed, nor did we even hear the characteristic howling of the larger kinds.

Aves: The aquatic birds we saw are generally met with on all the large rivers, unless they have been persecuted. We never saw a great number, probably on account of the high level of the river and other unfavourable conditions. The only exception was a large flock of white herons. The only species I had not yet observed in its wild state was *Chauna cristata.* I saw several of those on a sandbank of the lower Paraná and heard their strange voices on the Salado river. We also watched several tame ones in the garden of the Empreza ALLICA.

There were many araras on the banks of the river a large band of the red and green Kind (*Sittace choloroptera*) was a new and pleasant sight. The blue and yellow species, known by the name of *Canindé,* (*Sittace caerulea*), only appeared in small flocks. In some places tucans, parrots and pigeons were common and very conspicuous, as they perched on the dry steams of the giant bambou (*Chusquea Gaudichaudi*). The Jacutinga *(Pipile jacutinga*) is a common game bird all along the brasilian part of the river Paraná.

REPTILIA: In Iguassú I received a dead *jararaca (Lachesis lanceolata*) 140 cm. long. The *jararacussú* and the *urutú* (*L. jararacussú* and *alternata*) were also found. In the mu-

seum of Trinidad (Assuncion) I saw a rattlesnake, belonging to the type of Northern Brasil, and some *Lachesis*, of which a few were like *N. Neuwiedii* and others more like the species inapropriately called *L. cutiara*. There were also several species of *Elaps*.

PISCES: On the upper Paraná we only saw a few fishes which were caught on hooks during our excursions. Besides a fine *Suruby* there were a few *dourados*, *pacús* and *matrinchem*. A live specimen of *Lepidosiren paradoxus* was seen near Assuncion where it is not uncommon. Its native name is *Piramboia*.

CRUSTACEA: Just below the Salto de Guayra, or "das Sete Quedas" we found some *Phyllopoda* in active parthenogenic reproduction, in two pools of rainwater. They belonged to the genus *Eulimnadia*; the species may be *brasiliensis* SARS; at any rate the differences seemed too slight to distinguish a new species in this somewhat variable group. Their shells were covered with minute threadlike algae and the usual infusoria found on aquatic animals. *Phyllopoda* were again found in shallow places of lake Ipacarahy and determined as *Estheria Hislopi* BAIRD. In the plankton of the same lake we found three kinds of *Cladocera*, previously observed by ANIDITS, and determined by DADAY as *Diaphanosoma brachyura* LIEVIN, *Ceriodaphnia cornuta* SARS, and *Bosmina longirostris* LEYDIG. There was also a *Copepod*, *Diaptomus conifer* SARS, according to DADAY. All these species are also found in Europe.

INSECTA: To the entomological notes given above, I would add that, in Iguassú we received a fine *Fulgora* (vulgo *Jequitiranaboia*), of the species found in São Paulo and Rio; also a fine specimen of *Anoplocerus armillatus*, (*Prionidae*), one of the largest beetles known. In BERTONI'S collection I found a specimen of *Cuterebra Schmalzi*, first described by me from specimens collected in Santa Catharina.

5. Botanical notes.

The shores of the upper Paraná are entirely covered with woods. At the riverside there are many Cecropias, a series of large ficus and numerous leguminosae. Bamboos are plentiful and a giant species often grows higher than the surrounding trees. Larger and smaller creepers form real curtains hiding the roots and stems of the trees. At the waters edge there is often a continous fringe of *Eichhornia* tufts. They are sometimes swept away by the currents and form floating islands, known as *Camalotes*. In some places grasses take their place. Where there are cliffs *Cuphea melvilla* may be found beneath, while the rocks are covered by cactus and bromeliaceous plants.

In the midst of all this foliage few blossoms are seen. We noted a few flowering *Cassia* and *Inga* trees and *Bignoniaceae* with white, yellow, pink and purple blossoms.

On the rocks at and in the Iguassú falls we only saw a large and conspicuous *Graminea*.

At the mouth of the Iguassú and lower down, a *Croton* with long inflorescences was very abundant on the riverside; it alternated with *Sapindaceae* and *Saramby*. Green bamboos and dead *Chusquea* stems were also plentiful. This vegetation continued till near Encarnacion, being only interrupted by artificial clearings.

A creeper looking like *Mesechites sulphurea* was found near Porto Bandeira and seen again at Encarnacion, together with another apocynaceous plant with white flowers; these had a long and narrow tube and opened only at night.

In the campo near Encarnacion I saw several plants new to me, for instance two *Verbenae*, one of which had red flowers another interesting *Verbenacea*, a conspicuous blue *Labiata* and an *Ipomoea* (*? malvacea*). An *Eryngium* was plentiful, also *Mimosa pudica*, an *Angelonia* and other plants belonging to to the *Scrophulariaceae*.

The flora was the same till Assuncion. There we found also *Ipomoea fistulosa* in moist places, while in the water I noticed

two kinds of *Echinodorus*, a *Maranthacea* and a *Butomacea*. *Araujia stenophylla*, the latex of which may contain flagellates, as Dr. MIGONE discovered, was also plentiful. In the botanical garden we saw *Victoria regia* which is found in Paraguay.

On our excursion to the Rio Salado we noticed *Celtis glycocarpa*, a striking *Bignoniacea* and several other plants with showy blossoms.

Climatology and Sanitary Conditions by Dr. H. de Souza Araujo.

CLIMATOLOGY. There is not a single meteorologic station in the territory ranging from Baurú in the state of São Paulo, to the mouth of the Iguassú, on the frontier of the Argentine Republic and the state of Paraná, so I made rough notes on the altitude, mean and maximum temperature, rain falls etc. in the diary I kept during the journey.

From São Paulo to the river Paraná: the initial altitude is about 800 m.; in Baurú it falls to 500; in Porto Jupiá on the left bank of the Paraná to 250 m..

We were in the middle of Januay 1918 and the weather rainy. On the first four days of the journey the temperature oscillated between 26° and 30° C.

During the five days we spent in Porto Tibiriçá, it varied between 25. and 36. C., while the atmospheric pressure oscillated between 738 and 740 mm. This place is 270 m. above sea-level and the region is very warm; in summer the thermometer often registers 40° C.

On the second day of the journey from Porto Tibiriçá to Porto Mojoli (27. I. 18) the temperature ranged from 25. C. to 36; there was a thunder-storm in the afternoon. The pressure varied between 742 and 749 mm. On the following days we had from 25° to 30° C.

Porto Mojoli in the Guayra district is under the tropic of the Capricorn; it has an altitude of 225 m. Thanks to information obtained from the engineer of the Mate Laranjeira Comp., Mr. SIDWELL WILSON, we have more data about the climate of this region. KOEPPEN considers the climate of the Upper Paraná (paraguayan and argentinian zones) as sub-tropical. In later years there have been quite severe winters and rather warm summers in Porto Mojoli and Iguassú. Considerable oscillations of temperature and a mean temperature below 2° C. have also been registered. So, if one accepts Em. de MARTONNE's classification, the data obtained lead one to put the brasilian part of the Upper Paraná under the head of *temperate, with warm summer.* KOEPPEN includes all the paraguayan and argentinian territory on the left bank of the Paraná in his definition of a *temperate climate with warm summer.* In view of the continual heat and dampness, MARTONNE considers the basin of the Paraná and the Paraguay as *tropical, chinese type.* The information given me and my own observations support MARTONNE's opinion.

SANITARY CONDITIONS. The whole region of the State of São Paulo, between Baurú and Porto Tibiriçá, through which we travelled, is decidedly infected with Malaria. Ankylostomiasis and Chagas' disease are also widely spread, the former in high proportion. In the "sertões" of the North West, along the Itapura-Corumbá railway-line, Leishmaniosis is very common. *Triatoma* and *Phlebotomus* are very plentiful; the former transmits Chagas' disease, the later is suspected of carrying *Leishmania.* There are also many cases of Leprosy in this zone.

A short time ago two cases of granuloma venereum were in treatment at the Baurú hospital; the patients were cured by injections of emetic. During a certain season, cases of tropical Ulcer, caused by VINCENT's fuso-spirillar association, are common in the whole of the North-West.

Syphilis, Gonorrhea and other venereal diseases are not rare along the railway track. Trachoma, Amoebic Dysentery and Typhoid fever occur less often.

On the right bank (Matto-Grosso) the diseases are the same as those found on the

left (São Paulo). In Tres Lagoas, where we stayed the most common were ankylostomiasis and malaria. We found a great many specimens of *Triatoma sordida* in this town.

In Porto Tibiriçá, we treated 38 patients, almost all with malaria or ankylostomiasis. We also saw a typical case of Dysphagia spasmodica (mal de engasgo).

From Porto Tibiriçá to Porto Mojoli, we travalled in a barge belonging to the Mate-Larangeira Comp; it was towed by a a gazoline launch; several of the 16 members of the crew fell ill with malaria on the way.

Near Porto Xavier, we made a visit to an indian settlement between the mouth of the rivers Veado and the Ivahy. Some of the indians (tame Cayuas) were suffering from malaria. In Porto Isabel, on the Matto-Grosso bank, a litle below the Iguatemy, we saw about 20 workmen most of which were Paraguayans; some suffered from malaria while others had large two lobed goiters.

Porto Mojoli was founded in 1909 and now boasts 1300 inhabitants, with a great majority of paraguayans and correntinos. The town has canalised water and public W. C. in several places. The company, w yich owns it, furnishes food supplies at moderat prices and there is fresh meat every day. An efficient and strict police service ensures order though the latter may also be attributed to the prohibition of the sale of alcoholic drinks. Most people speak the paraguayan language (Guarany). A Décauville railway belonging to the Mate company goes from Porto Mojoly, around the Guayra falls which are about 5 kilometers from the town, to Porto Mendes. The company also keeps a physician, a drug-store and a hospital for its workmen. The actual physician is Dr. FRANCISCO VARELLA. When we visited the hospital we saw 37 patients there. Malaria and Ankylostomiasis prevail; the first is brought from Matto-Grosso the second from Paraguay. We also saw some goiters. The sanitary conditions of the settlements, Porto Artaza, Bella Vista, Zororô and Porto Mendes are superior to those of Porto Mojoli and Porto Tibiriçá. All of them are almost exclusively inhabitated by Paraguayans and Correntinos.

Water pipes have been laid in Porto Artaza which belongs to Mr. Julio Allica, who claims that in this settlement hygiene is practised as a sort of religion. The population is argentinian and there is more morality than in Porto Mojoli. All these settlements form part of the borough of Iguassú.

Iguassú (the town). This old military colony was made a borough in 1917. The town is lit by electricity and has a telegraph office. The water is not canalised. The sanitary state is good. In 1905 and 1906 there was a bad epidemic of malaria, but in the last few years only a few sporadic and imported cases were observed. We saw no patients with ulcers or any other important diseases, with the exception only of some grave cases of leprosy. Iguassú has no physician and no dispensing chemist. Patients whose means allow them to do so go to Posadas, in the Argentine, to be treated.

PARAGUAY: ASSUNCION. This attractive capital occupies the left bank of the Paraguay about 100 m. above sea-level. It has 100.000 inhabitants and about 40 doctyrs, some of which are foreigners. There is no pipe system, but there are electric trams, fine buildings and public gardens.

SANITARY CONDITIONS. The President of the Republic, whom we visited, showed a great interest in hygiene and specially in rural prophylaxy and told us that in the same year, (1918), he intended to reopen the faculty of Medecine which has been closed for several years. Dr. ANDRÈS BARBERO gave us interesting information about the sanitary condition of the country and about the frequency of leishmaniosis among the patients treated in the department for "bubaticos" of the Assistencia Publica. Dr. BARBERO intends to establish more posts for the treatment of leishmaniosis in other parts of the country, and to begin a campaign against malaria and ankylostomiasis in the near future.

Assumpção has a National Hospital, a Military Hospital, and a Maternity hospital as well as its Assistencia Publica and its isola-

ting hospital where some lepers are interned. There is also a Bacteriologic Institute under the direction of Dr. LUIZ MIGONE. Besides these there are a few private sanatoria.

Chagas' disease has been found in Paraguay. We examined several specimens of *Triatoma megista* with Dr. MIGONE; they were infected. Malaria is found in several regions and even in the neighbourhood of Assuncion. Ankylostomiasis and other worm diseases are spread over the whole country, which is hot, damp and low.

. Leishmaniosis is by far the most common skin disease in Paraguay. There are also same foci of Leprosy in different zones. Many cases of Granuloma venereum have been observed in the National Hospital o Assuncion and elsewhere. The real "Bouba" Framboesia tropica, and Blastomycosis are unynown. Perhaps these two diseases, found almost all over South America, have only passed unnoticed.

Syphlis and Gonorrhea are as common in Paraguay, as in Brazil.

We made some excursions, collected many insects amd made interesting medical notes.

ARGENTINE. On the return journey, to Brasil, we stopped saveral days in Buenos Aires. We saw the Bacteriologic Institute, the Faculty of Medicine the Hospitals, Museum and botanical Gardens. The efficient organisation of the hospitals made a very good impression. All the foreign colonies have their hospital and a wel arranged medical assistence. The most interesting sections of the Faculty of Medicine are the gynecological museum, the department of experimental physiology, the wards, the botanical and pharmacologic Institute etc.

The bacteriological Institute is quite ready and working under the direction of Prof. KRAUS. In the Muniz Hospital, we saw many cases of typhoid fever, anthrax and leprosy.

Dr. ABERSTURY and Dr. SOMMER gave us interesting information about the prophylaxy of leprosy. Granuloma venereum aud leishmaniosis are quite common in Ramos Mejia and in other hospitals.

URUGUAY MONTEVIDEO. We only spent one day in this fine city, but saw the wards of the MACIEL hospital, the Radiological Institute, the National Syphilicomium and the Natural History Museum.

SOUTH of BRASIL. RIO GRANDE DO SUL. I visited the following towns in this state: Rio Grande, Pelotas, Bagé and Porto Alegre, and made some excursions in the neighbourhood of Bagé and Rio Grande.

Sanitary Conditions. There is a high percentage of Ankylostomiasis in the vicinity of Rio Grande. Malaria is hardly known. Epidemics of Smallpox and of Chickenpox have broken out recently. I registered 7 cases of Leprosy. There is a Charity Hospital in the town. At the time of my stay I found very may mosquitos, specially *Culex albofasciatus* and *Stegomyia calopus*. From Bagé I have little to report; according to several doctors Syphilis is the worst infection. In the interior of this district I caught many specimens of *Neotabanus missionum* and several *Culicidae*. The Bagé hospital is well installed and treats many patients. That of Pelotas also makes a good impression; the municipality has also made an Institutey for Hygiene and put it under the direction of Butantan. In this place I saw several lepers and a patient with an ulcer of the lower lip which looked like leishmaniosis.

In Porto Alegre. I remained longer and saw the "Santa Casa", the faculty of Medicine, the Instituto Oswaldo Cruz, Dr. PEREIRA's bacteriologic laboratory etc. During my stay, March and April, several cases of Plague were registered and the town was visited by an epidemic of Typhoid fever. A little while before, there had been a severe epidemic of smallpox. Vaccination is facultative and left to the private initiative of the people who must request it from the public health officer. The medical service is altogether very defficient. Chagas, disease is found in Rio Grande. All the specimens of *Triatoma* we examined in the Instituto Oswaldo Cruz were infected. The principal foci of *Triatoma*

are now known and doctors from the Institutes Borges Medeiros and Oswaldo Cruz have undertaken to clear up this point of local nosography. In Rio Grande, the most common species of "barbeiro" is *Triatoma infestans*.

I saw some lepers and, from the information I gathered from other physicians, I concluded that there must be some 30 patients in the town. In other districts there are other foci, some of them very bad ones.

Filariosis has also been found. I saw no interesting skin diseases.

Dr. PEREIRA jun. and other medical men told me that almost the whole of the suburban population, specially that of the banks of the Guahyba and the Lagoa dos Patos, suffers from ankylostomiasis.

SANTA CATHARINA. It was m ysecond visit, but as before I could not stay long enough to see the capital and some of the ports. I heard of several cases of leprosy in the capital and inland. Ankylostomiasis is extremely common all along the coast but no intensive prophylactic measures have been taken as yet. Malaria seems less widely spread than on the coast of Paraná and São Paulo.

PARANÁ. The coast of Paraná is overrum by Malaria and Ankylostomiasis. I spent the first three months of 1917 in five coast districts, that is in Paranaguá Morretes, Antonina, Guarakessaba and Guaratuba, to which the government of Paraná had sent me on a medical mission. During that time I made statistics of the prevailing diseases which I intend to use as a basis for a sanitation campaign.

Malaria has been endo-epidemic in the North of the State for the laste ten years. The ep demics of 1913, 1915 and 1917 were terrible and caused enormous losses. During the last ones, I directed the medical campaign, being aided by two other phy sicians. We crossed eight districts and founded an antimalarial station in the central one; this was under my direction during the last six months of 1917 and the first four of 1918. The campaign gave good practical results.

Now, with the help of the government, we are going to work on a larger scale. am also making statistics of leprosy in the whole state so that the prophylaxy may be organised. Altogether there must be about 500 lepers in Paraná. Some foci of leishmaniosis have been found. I am also preparing to go the North of the State, to study Chagas' diseases, the transmittor of which is common in Jatahy and elsewhere.

Protozoology and Planktology
by
Dr. O. Ribeiro da Fonseca.

In this chapter I only deal with the data obtained during our journey which can furnish a basis for original research.

I did not give much time or attention to the protozoa found in sweet water, as there is still a lack of good methods for preserving them and circumstances made it impossible to study them "in loco". This is also true of the potamoplankton of the rivers on which we travelled; I gathered samples of it several times, but they were all so poor in specimens as to make their study very difficult. These investigations were limited to the Paraná and the Pequery.

Lake Ipacarahy, in Paraguay, was also studied from a planktologic point of vue, but the nets only yielded a great many *Copepoda*, some other small *Crustacea* and a few *diatoms (Naviculoidea)*. This lake ought to be worth studying, because its water is grey or blackish even in the shallow parts.

The study of protozoa, parasitic in man and other animals, and that of the oceanic microplankton found from the coast that Uruguay (al the limit with brazilian waters) to of Sta. Catharina, gave much better results. There were new and rare species belonging to one or the other of these groups, as well as interesting biologic and geografic data, which will be published in due time, by Dr. ARISTIDES MARQUES DA CUNHA.

Parasitic protozoa: During the whole of the excursion, I tried to gather interesting material, both from patients and from the game that was shot. I obtained representants of

several groups of Protozoa, specially *Flagellata* and *Ciliata*, but there were some *Neosporidea* (*Myxosporidia*) and some *Telosporidea* (*Gregarina*), as well.

Among the ciliata was *Balantidium coli*, a parasite of man; we found it only once during the journey. The patient showed no symptoms of dysentery, nor did she complain of any other intestinal trouble; all her symptoms were limited to the nervous system. This case we found in Iguassú, while looking for Ankylostomum eggs. It was not the first time I found *Balantidium coli*, in a case, where though present, it has no apparent pathogenic effect. (Vide Brazil-Medico vol. 32 n. 4 p. 26.). *Balantidium coli* is common in the interior of the state of Rio; I have come across it, in an apparently harmless condition, several times, while making helminthologic examinations.

To me the most interesting ciliata found in game, were those from the stomach of the big stag *(Cariacus paludosus* DESM.) and the caecum of the "anta" *(Tapirus americanus* BRISS.). I gave them to an assistent of this Institute, Dr. A. MARQUES DA CUNHA, who has not yet determined all of them; they belong to new genera and species and will be described later on, with the exception of one, already described in Brazil-Medico vol. 32 n. 12 p. 161. (1918), under the name of *Prototapirella intestinalis*; *Cycloposthidae*.

The most important flagellate met with on this journey was *Trypanosoma cruzi*. Some specimens of *Triatoma infestans*, we examined in Dr. MIGONE's laboratory, in Assuncion, were copiously infected with it. These specimens came from places near the capital which we did not have time to visit. We also saw several workmen with goiters in Porto Isabel; they all came from the interior of the country. Putting these facts together I feel justified in affirming that *Trypanosomiasis americana* exists in Paraguay. The fact, that it has not been described from that republic, seems to me no argument to the contrary, since, though widely destributed in Brazil, it went unnoticed for a very long time.

Trypanosoma equinum, the cause of equine trypanosomiasis, attacking horses and mules, is distributed over a wide area of the territory through which we passed. We visited one of the historic foci of this disease on the river Salado near San Bernardino. In the same place *Araujia angustifolia* (Asclepediaceae) grows very plentifully. Dr. MIGONE found a *Leptomonas* in the latex of this plant and described it as *L. elmassieni*, in honour of the discoverer of *Trypanosoma equinum*. It has many affinities with this genus.

Leishmaniasis americana, locally called Baurú ulcer, and its agent *Leishmania brasiliensis*, are well-known in this country; they are widely spread in the regions of Paraguay and the north-west of São Paulo in which we travelled. It is interesting to note here, that during the whole of the journey we found only one specimen of *Phlebotomus* and that near the Santa Maria falls of the river Iguassú, a very sparsely populated region, from which no cases of Leishmaniosis were brought to our notice. According to Dr. MIGONE, this is not the only kind of *Leishmania* observed in Paraguay, since he treated (in Assuncion) the only case of Kala-azar or visceral leishmaniosis, as yet found in America.

Owing to the kindness of Dr. CASTRO GOYANA, I was able to examine several case of dysentery in Baurú (north-west of São Paulo). In one case I found *Chilomastix mesnili* WENYON only; in another the same *Chilomastix* and *Enteromonas hominis*, first described from Rio by me. Both cases were interesting. The first helps to confirm my belief that *Chilomastix* is much more common in the country than in towns like Rio, where *Trichomonas hominis* and *Giardia intestinalis* are more frequent. The presence of *Enteromonas hominis* in the second case I find still more interesting, as, after I described it from Rio, this species was found in two cases in Anglo-Egyptian Soudan by CHALMERS and PEKKOLA; recently, it has been mentioned by MAURICE LÉGER as a parasite of man in French Guyana. Con-

sequently, it must have a very wide geographic distribution.

We found the plasmodia of tertian fever *Laverania malariae* (GRASSI & FELETTI 1890) and *Plamodium vivax* (GRASSI & FELETTI), but heard of no cases of infection with *Plasmodium malariae* LAVERAN 1881, causing quartan fever.

Fish microsporidia were conspicuous y rare during the whole journey; though I examined all fishes caught on excursions, I only found one infected species; this was *Pseudopimelodus charus*, commonly called "pacú". The parasite was a new species of the genus *Henneguya* which Dr. A. M. da CUNHA and I described as *H. lutzi* (Vide Brazil Medico vol. 32 n. 52 p. 414).

Microplankton. As already explained, I will not deal either with the potamoplankton of the rivers Paraná and Pequery or the limnoplankton of lake Ipacarahy, but shall only give a list of the *Protozoa* and *Diatomacea*, collected from the coast of Uruguay (frontier of Brazil) up to that of Sta. Catharina. I found 59 species, many of which had not been found in brazilian waters before. A more minutious study of these and of other material, collected by Dr. A. M. da CUNHA, is now in the press.

Follows the list:

Cystoflagellata.

1 – *Noctiluca miliaris* Suriray, 1836.

Tintinnodea.

2 – *Codonella morchella* Cleve, 1900.
3 – *Tintinnopsis beroidea* Stein, 1867.
4 – *Tintinnopsis campanula* (Ehrenberg 1840).
5 – *Cyttarocylis ehrenbergii* (Clap. *et* Lachm., 1858) *var. claparedei* (Daday, 1887).
6 – *Ptychocylis (Rhabdonella) apophysata* (Cleve, 1900).
7 – *Tintinnus ganymedes* Entz, 1885.
8 – *Tintinnus lusus-undae* Entz, 1885.
9 – *Tintinnus amphora* Cl. *et* Lachm. *var. quadrilineatum* (Cl. *et* Lachm. 1858).

Schizophyce .

10 – *Richelia intracellularis* (Schmidt, 1901).
11 – *Prorocentrum micans* Ehrenberg, 1838.
12 – *Dinophysis ovum* Schuett, 1895.
13 – *Dinophysis schuetti* Murray *et* Whitting, 1899.
14 – *Dinophysis homunculus* Stein, 1883.
15 – *Glenodinium trochoideum* Stein, 1883.
16 – *Goniodoma polyedricum* (Pouchet) Joergensen, 1899.
17 – *Peridinium steini* Joergensen, 1889.
18 – *Peridinium depressum* Bailey, 1855.
19 – *Peridinium divergens* Ehrenberg, 1840.
20 – *Peridinium pentagonum* Gran, 1902.
21 – *Oxytoxum scolopax* Stein, 1883.
22 – *Oxytoxum milneri* Murray *et* Whitting, 1899.
23 – *Ceratocorys horrida* Stein, 1883.
24 – *Ceratium candelabrum* (Ehrenberg) Stein, 1883.
25 – *Ceratium furca* (Ehrenberg) Clap. *et* Lachm, 1859.
26 – *Ceratium fusus* (Ehrenberg, 1883) Dujardin, 1841.
27 – *Ceratium incisum* (Karsten, 1906).
28 – *Ceratium belone* Cleve, 1900.
29 – *Ceratium pentagonum* Gourret, 1883.
30 – *Ceratium penatum* Kofoid, 1907.
31 – *Ceratium palmatum* (Schroeder, 1900) Schroeder *var. ranipes*, Cleve.
32 – *Ceratium massiliense* Gourret, 1883.
33 – *Ceratium trichoceros* (Ehrenberg, 1859) Kofoid, 1908.
34 – *Ceratium tripos* (O. F. Mueller, 1777).
35 – *Ceratium gibberum* Gourret, 1883.
35a – *Ceratium gibberum* Gourret, 1883 forma *sinistrum* Gourret, 1883.

36 – *Ceratium reticulatum* (Pouchet, 1883) Cleve.
37 – *Podolampas palmipes* Stein, 1883.
38 – *Podolampas bipes* Stein, 1883.

Silicoflagellata.

39 – *Dictyocha fibula* Ehrenberg, 1839.

Diatomacea.

40 – *Melosira borreri* Greville, 1856.
41 – *Paralia sulcata* (Ehrenberg, 1837), Cleve.
42 – *Skeletonema costatum* (Greville, 1886) Cleve.
43 – *Leptocylindrus danicus* Cleve, 1889,
44 – *Guinardia flacida* (Castracane. 1886) Peragallo.
45 – *Rhizosolenia schrubsolei* Cleve, 1881.
46 – *Rhizosolenia setigera* Brightwell, 1858.
47 – *Rhizosolenia calvar-avis* Schultze, 1858.
48 – *Rhizosolenia alata* (Brightwell, 1858), forma *genuina* Gran, 1911.
48a – *Rhizosolenia alata* (Brightwell, 1858), forma *gracillima* Cleve.
48b – *Rhizosolenia alata* (Brightwell, 1858), forma *indica* (Peragallo, 1892).
49 – *Bacteriastrum furcatum* Schadb. 1854.
50 – *Chaetoceras schuetti* Cleve, 1894.
51 – *Chaetoceras subtile* Cleve, 1896.
52 – *Cerataulina bergonii* Peragallo, 1892.
53 – *Biddulphia mobiliensis* (Bailey) Gruen., 1859.
54 – *Biddulphia sinensis* Grev., 1866.
55 – *Biddulphia rhombus* (Ehrenberg) W. Smith, 1844.
56 – *Biddulphia favus* (Ehrenberg, 1839), V. Heurck.
57 – *Biddulphia vesiculosa* (Ag.) Boyer, 1824.
58 – *Bellerochea malleus* (Brightwell) V. Heurck, 1858.
59 – *Thalassiothrix nitzschioides* Gruenow, 1862.

Explanation of Photographs

(Plates 20—75.)

1. Hospital in Baurú.
2. Case of lepra mutilans found in the hospital.
3, 4. Falls of Itapura. Right and left side.
5. Ferryboat of the Itapura—Corumbá Railway, in Porto Jupiá.
6. Steamer Paraná of the C. de Viação S. Paulo-Matto Grosso.
7. A tame Aririnha (*Lutra paranaensis*). in the hotel of Porto Tibiriçá.
8, 9. A tapir hunt on the banks of the Rio Pardo.
10. Stag hunting on the Campos of Matto Grosso.
11. Cecropia trees in the bank of the Paraná.
12. Left bank of the river Guatemy in Matto Grosso.
13. Porto Xavier on the left bank of the Paraná.
14. Mr. Wilson and Dr. Fonseca with a group of Cayuás.
15. One of the travellers covered with mosquitos.
16. Mouth of Rio Veado. Dr. Lutz and Mr. Vasconcellos in a Cayuá canoe, returning from the indian settlement.
17. Indian hut between the rivers Ivahy and Veado.
18. 19. Cayuá Indians.
20—22. Cliffs on the right bank of the Paraná.
23. Mouth of Rio Ivahy.
24. Dead giant bamboo on the left bank of the Paraná.
25, 26. A Suruby caught in the Paraná.
27—30 Views of the Pequery river.
31. Launch Roseira belonging to the Lloyd Paranaense.
32. Porto Mojoli, islands in front of the landing place. (The width of the river is 4 kilom).
33. Ditto. Seen from the river.
34. Ditto. Barges starting for Matto Grosso
35. Ditto. Preparing for departure. Manager Jara, Captain Ricardo Mendes. and Dr. Varella.
36. Ditto. Paraguayan woman and girls.
37. Ditto. Paraguayan woman ready to start for Matto Grosso.
38. Ditto. A house belonging to the Companhia Mate Laranjeiras in which the travellers stayed.
39. Ditto. Spary rising from the falls (Salto de Guayra or Sete Quedas).
40, 41. Ditto. Fall n. 18.
42. The Paraná below the Guayra falls (less then one hundred meters wide).
43. Whirlpool below the Guayra falls.
44. Only port on the Pequery, near Manoel Silvino's hut.
45 Train on which the the commission travelled from Porto Mojoli to Porto Mendes.
46. House and cable railway in Porto Mendes. A boiler weighing three tons is being hoisted up from the river.
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Étude expérimentale sur la grippe pandémique

par les Docteurs

Aristides Marques da Cunha, Octavio Magalhães et O. da Fonseca.

Les premiers résultats de nos recherches, faites à l'Institut O. Cruz de Rio et celui de Bello Horizonte, lors de la pandémie de grippe, furent publiées sous forme de note préliminaire dans le Brazil-Medico du 30 Nov. 1918.

Aujourd'hui, nous voulons donner les détails de ces recherches faites sur l'étiologie de la maladie, puisque c'est elle qui doit servir de base rationelle à la prophylaxie et au traitment.

Selon l'avis de quelques uns de nos pathologistes les plus considérés, la grippe serait produite, comme la pneumoentérite des animaux, par un germe filtrable. Cette opinion est en grande partie due aux observations cliniques et épidémologiques, faites au début de la pandémie. Parmi ses représentants se trouvent MM. les Docteurs ALCIDES GODOY, MARQUES LISBOA, EURICO VILLELA et ASTROGILDO MACHADO, dont les connaissances approfondies de pathologie les menèrent très tôt a l'observation de l'analogie clinique et épidémologique entre la grippe d'un cotê et les maladies de homme et des animaux produites par des germes filtrables (rougeole, rhume, hogcholera etc), d'un autre. Ces idées *a priori*, nous servirent de point de départ, nous déterminant à la recherche d'un virus filtrable au moyen d'expériences, faites à un point de vue purement microbiologique.

Nous eûmes la sastifaction d'arriver à des résultats assez concluants et surtout de savoir que quoique l'orientation de nos études leur fût donnée lorsque nous ignorions encore les investigations des auteurs européens, elle leur fut semblable et conduisit aux mêmes résultats. En effet, nous étions déjà en voie de publication lorsque nous reçûmes les travaux de NICOLLE, LEBAILLY et VIOLLE, dans lesquels ces auteurs décrivent les premiers résultats de la production artificielle de la grippe chez l'homme et les animaux de laboratoire, au moyen d'inoculations de sang et de crachats filtrés.

Loin de diverger des leurs, nos expériences sont semblables, sauf pour quelques petites questions de détail ; les résultats en sont identiques ou de nature à se compléter mutuellement.

L'étude étiologique, faite dans le but de trouver, soit le bacille de PFEIFFER, soit un autre germe auquel on pourrait attribuer la maladie, fut inicíée dès l'apparition de l'épidémie à Rio.

Les premiers cas se montrèrent parmi les soldats du 56e bataillon de Chasseurs. En partant d'eux, le Docteur CHAGAS inicia les recherches qui furent continuées par les Docteurs ASTROGILDO MACHADO et COSTA CRUZ ; ils isolèrent, de la gorge des malades et même par hémoculture, un di-

plocoque qui fut consideré l'agent pathogène pendant un certain temps parce qu'il était très commun et existait dans le sang aussé. Mais les expériences d'inoculation d'animaux donnèrent des résultats négatifs et celles faites sur l'homme n'étaient pas concluantes. Le diplocque en question est petit et forme souvent des chaines. Il prend le Gram et se montre assez exigeant pour les milieux, ne donnant que des cultures maigres sur milieux ordinaires, mais abondantes sur milieux contenant du sang et du glucose, ainsi qu'en anaérobiose.

D'autres auteurs ont aussi isolé, de la gorge de grippés ou par hémoculture, des organismes dont les caractères coincident avec ceux de notre diplocoque.

Le bacille de PFEIFFER fut isolé aussi, mais les essais d'inoculation chez l'homme et les réactions d'immunité, ne donnèrent pas de résultat.

En plus des investigations d'ordre bactériologique, faites en partant de cas de grippe et de complications qui survinrent, nous nous occupâmes de:

1o. Hémocultures.

2o. Inoculations de sang et de filtrat de crachat (homme et animaux de laboratoire).

3o. Vaccinothérapie avec des filtrats de crachat.

4o. Autohémothérapie.

5o. Réactions d'immunité.

La vaccinothérapie prophélactique ne put être faite, puisque la pandémie était déjà en pleine période de declin quand nous étions arrivés à des résultats qui la conseillaient.

1. Les hémocultures.

Nous avons cherché les germes du sang en circulation chez une dizaine de grippés, au moyen de hémocultures faites pendant les deux premiers jours de la maladie, c'est à dire au moment de la première période fébrile. Les échantillons de sang étaient obtenus aséptiquement par ponction veineuse et semés sur tous les milieux ordinaires, ainsi que sur des milieux speciaux contenant du sérum, du sang, du liquide d'ascite, et du glucose ou en anaérobiose. Notre attention se portait tout specialement sur les milieux favorables au développement des spirochètes et des corpuscules globoïdes de la poliomyélite endémique (milieux de NOGUCHI). Nous n'avons obtenus les corpuscules, décrits par FLEXNER comme agents de la polioméélite, qu'une seule fois, en milieu de NOGUCHI. L'inoculation de 3 cc. de cette culture dans le péritoine de quelques cobayes ne produisit aucune réaction.

Les cultures de liquide céphalo-rachidien de grippés présentant des signes de meningite restèrent également stériles.

2. Les inoculations.

Les 14 expériences d'inoculation furent faites sur une quarantaine d'individus (hommes, cobayes et 6 espèces de singes). Elles avaient le double but de vérifier la présence du *virus* dans le matériel en étude et d'établir la transmissibilité expérimentale de la grippe.

Presque tous les animaux furent inoculés avec des produits considerés virulents, mais quelques uns furent inoculés avec des produits normaux, ou même seulement soumis à l'observation à titre de témoins.

La préparation des produits inoculés.

Le sang provenait des grippés au premier ou au deuxième jour de la maladie; exceptionellement au troisième. Dans quelques cas il fut inoculé tel quel; dans d'autres, après défibrination, et dans d'autres encore, après filtration et dilution au dixième. Dans ce dernier cas la filtration durait deux heures et le sang était injecté immédiatement après sa fin, tandis que dans les deux premiers, il était inoculé tout de suite après la défibrination ou la saignée. Nous fîmes, en principe, des cultures du sang inoculé sur milieux ordinaires, surtout sur agar-sang et sur milieux de NOGUCHI pour les anaérobies. Sauf pour l'exception signalée plus haut les milieux restèrent stériles.

En plus des inoculations de sang, nous fîmes d'autres de moëlle osseuse triturée et diluée d'un individu mort de grippe. Les inoculés furent un *Jacchus penicillatus* et un singe du genre *Cebus* qui ne présentèrent rien d'anormal.

Le crachat tel quel ne fut inoculé qu'une seule fois et par le larynx, puisque nous craignions les infections secondaires que pourrait amener un autre genre d'introduction d'une substance si riche en germes. L'inoculé présenta des irregularités thermiques que nous attribuons a la présence de ces derniers puisque elles ne furent constatés chez aucun animal inoculé avec du crachat filtré. Les bougies BERKEFELD et CHAMBERLAND furent employées toujours après dilution au cinquième en eau physiologique et homogénisation mécanique par agitation au moyen d'un bâton de verre ou en flacon à billes. Les cultures témoins demontrèrent l'absence de bactéries dans tous les filtrats employés. Les cultures sur agar-sang furent surtout observées au point de vue du bacille de PFEIFFER et celles sur milieux de NOGUCHI au point de vue des corpuscules globoïdes. Nous nous sommes intéressés tout particulierèment à la question du passage du bacille de PFEIFFER à travers les bougies et avons constaté qu' il pouvait se développer sur l'agar-sang. resté stérile après inoculation de crachats filtrés, mais seulement à conditition d'être semé en partant de races isolées d'un grippé. Mais même si l'on arriverait à demontrer sa filtrabilité, cela n'annulerait pas nos expériences, puisque les conditions de filtration du crachat dilué et celles de la filtration d'eau physiologique pure sont bien différentes. Pour apprécier le degré du pouvoir filtrant des bougies employées par rapport à la solution filtrée, ainsi que pour éviter l'inoculation d'eau physiologique pure, nous faisions une recherche rapide d'albumine dans les substances filtrées.

Expériences d'inoculation.

a) SANG.

1re expérience. Singe. Un singe du genre *Cebus* est inoculé avec environ *8* cc. de sang nature, provenant d'un grippé au premier jour de la maladie. La réaction est intense et prolongée. (Courbe n. 1).

2me expérience. Ouistiti. Le sang d'un grippé en pleine période fébrile, état avancé de la maladie, est inoculé à un *Jacchus penicillatus*. Il meurt 12 jours après; l'autopsie révèle la présence de pneumocoques dans la rate.

3me expérience. Cobayes. Trois cobayes sont inoculés par la voie intra-péritoneale avec 2 cc. du sang d'un grippé; un autre avec 3 cc., et un autre encore avec 5 cc. du-même sang. Celui qui reçoit 3 cc. donne une réaction faible. (Courbe *2*) ; les autre-réagissent fortément présentant une hyperthermie accusée et prolongée. (Courbes 3 à 6).

4me experience. Cobayes. Trois cobayes, inoculés avec du sang de grippé en état fébrile, au premier et au deuxième jour de la maladie, en raison de 2, 3 et 5 cc., ne réagissent point.

Témoins.

Sept cobayes sont inoculés avec du sérum humain normal et six autres avec du sang humain normal, nature. Aucune réaction.

b) MOELLE OSSEUSE.

6me experience. Singe et Ouistiti. La moëlle osseuse tritutrée et diluée d'un individu mort de grippe est inoculée sous la peau d'un singe du genre *Cebus* et d'un *Jacchus penicillatus*. Point de réaction thermique accusée.

c) CRACHAT.

7me expérience. Singe. Un singe est inoculé (deux fois en deux jour successifs) avec des substances prises dans la gorge d'un grippé. Il donne une réaction thermique 24 heures après la deuxième inoculation. La courbe est très irregulière, ce qui est peut être dû à la collaboration d'autres germes avec le virus de la grippé. (Courbe 7).

8me expérience. 20 cc. de crachat filtré sont introduits sous la peau d'un singe du genre *Ateles* et 20 autres dans son péritoine. La réaction thermique est nette et prolongée (Courbe 8).

9me expérience. Singe. Un singe du genre *Cebus* inoculé de la même façon que le précédent donne une forte réaction. (Courbe 9.)

10me expérience. Singes. 5 cc. de filtrat de crachat sont inoculés au singe de la neuvième expérience et 5cc. a un autre de la même espèce qui n'avait encore subi aucune inoculation. Le singe inoculé pour la deuxième fois ne réagit plus; l'autre réagit fortement atteignant 41° C. (Courbe 10).

11me expérience. Cobayes. Trois cobayes sont inoculés avec 2, 3, et 5 cc. de crachat filtré. Celui qui reçoit les 5 cc. réagit franchement. Les autres ne réagissent point.

12me expérience. Homme. Un filtrat de crachat est inoculé dans le pharynx de deux hommes dont l'habitation commune est complètement à l'abri de la grippe; les doses sont pour un d'eux 5, pour l'autre 10 cc. Aucune réaction.

13me expérience. Le crachat filtré de la gorge d'un grippé est inoculé par la même voie à deux hommes et sous la peau de deux autres, vivant dans les conditions de l'expérience 12. Le résultat est identique.

14me expérience. Cobaye. Le singe qui réagit lors de la dixième expérience est saigné quand sa température est à 41° C.; 5 cc. du sang sont injectés dans le péritoine d'un cobaie et 5 cc. dilués en eau physiologique sont injectés à trois autres par voie intrapéritonéale, à raison de 5 cc. Aucune réaction.

Témoins.

Une émulsion de diplocoque, inoculée dans le pharynx d'un *Cebus* et une émulsion du bacille de PFEIFFER inoculée dans le pharénx de deux hommes, ne provoquent aucune réaction.

3. Vaccinothérapie par filtrats.

L'impossibilité de faire une culture du virus étant demontrée par les expériences précédentes, l'orientation de nos recherches nous mena à nous servir des substances virulentes provenant des malades, pour la préparation du vaccin. Nous employâmes donc des filtrats de crachat, préalablement chauffés et traités par l'acide phénique, pour les injections faites sous la peau des grippés.

Nous ne pouvons arriver à aucune conclusion définitive sur les résultats de ce procédé parce qu'il ne fut employé qu'une demi-douzaine de fois; nous signalerons pourtant que, comme on le vera par le résumé qui suit, les résultats furent favorables. Tous les essais furent faits sur des adultes.

1re observation. Cas avancé. La température oscille entre 38° et 39° C. depuis 10 jours. Une seule dose de 2 cc. est employée. Elle ne donne pas un résultat favorable (Courbe 12).

2me observation. Cas avancé et grave. Température se maintenant au-dessus de 39° C. Deux doses sont employées en deux jours successifs. La température baisse dès la première dose et tombe a 36° C. après la deuxième (Courbe 13).

3me observation. Cas récent. Température continuellement entre 38,8° et 39° C. Emploi d'une dose de 2 cc. de crachat filtré. 12 heures après chute de la température à 37° C. La vaccination n'est pas répétée et 3 jours après la température remonte à 38° (Courbe 14).

4me observation. Cas récent. Température 39,6°. Emploi de 4 cc. de filtrat. La température tombe à 37,4°; elle remonte à 38° C., sans que la dose soit renouvelée. (Courbe 15).

5me observation. Cas récent, deuxième jour de la maladie. Température 38° C. Inoculation de 2 cc. de filtrat, chute à 38,8° C., puis oscillations pendant deux jours, ensuite chute à 37,4° C. (Courbe 16).

6me observation. Cas récent, premier jour de la maladie. Température: 39,2° C. Emploi de 6 cc. de filtrat; chute immédiate et continuelle à raison de 1° par 12 heures, atteignant 36° C. le deuxième jour (Courbe 17).

4. Autohémothérapie.

Ce procédé fut employé pendant la période la plus critique de l'épidémie. Il était justifié par le fait que (l'existence du *virus*

dans le sang en circulation étant admise) ce sang devait avoir des propriétés vaccinantes et agir comme antigène au moins pendant les phases de septicémie. L'accumulation de travail qui survint à ce moment nous empêcha de réunir des données numériques précises sur les résultats de l'autohémothérapie. Nous ne donnons donc que notre opinion, basée sur l'observation de 49 cas dans lesquels elle fut appliquée par nous. Ce ne furent pas les seuls, puisque le procédé divulgué par la presse ne quotidien fut employé dans la clinique privée et dans les hôpitaux.

Au début, les doses variaient entre 5 et 10 cc., injectés sous la peau du même malade immédiatement après la saignée. Plus tard elles furent augmentées jusqu'à un maximum de 30 cc.

La vaccinothérapie fut d'abord apliquée à vingt grippés, pris au hasard. Le lendemain ces malades se portai ét déjà beaucoup mieux ; un d'eux était même déjà en état de quitter l'hôpital.

Nous choisîmes alors 6 autres malades en traitement. Parmi eux il y en avait un presque agonisant et qui mourut le jour même. Chez un des autres, la fièvre persistait et d'autres procédés durent être appliqués ; mais la fièvre des autres malades tomba dans les 24 heures.

L'emploi de fortes doses de sang donna des résultats favorables et parfois excellents chez 23 autres grippés, aprés que d'autres traitements avaient échoué.

Il nous semble que pour la grippe les résultats de l'autohémothérapie dépendent de la présence ou l'absence du *virus* dans le sang en circulation. Les expériences de transmission expérimentale démontrent qu'il ne l'est pas toujours ; c'est donc impossible d'avoir des résultats constamment favorables, tant que la phase de septicémie n'est pas connue. En résumé ; l'autohémothérapie est efficace pendant une certaine période encore mal déterminée.

5. Réactions d'immunité.

Nous avons fait quelques expériences sur l'immunisation par les filtrats de crachat de grippés. La plus intéressante en était la dixième (voir plus haut) qui consista en l'inoculation, avec le même crachat, de deux singes de la même espèce, dont un pour la première fois, l'autre pour la deuxième. Le premier réagit fortement (41° C.) tandis que le second (qui avait donné une forte réaction lors de la première inoculation) ne réagit plus.

La réaction de fixation de complément entre sérum normal et crachat fut négative, tandis que les réactions de précipitation entre sérum normal et sérum de convalescents donnèrent les résultats suivants :

1.	Sérum humain (convalescent)	Positif
2.	« « «	«
3.	« « «	«
4.	« « «	«
5.	« « «	«
6.	« « «	Négatif
7.	« « «	«
8.	« de cobaye inoculé avec du sang bien des jours auparavant	«
9.	« « « « « « « « « « «	«
10.	« « « « « « « « « « «	Positif
11.	« « « « « « « « « « «	Négatif
12.	« « « normal	«
13.	« « boeuf «	Positif
14.	« « singe inoculé avec le bacille de Pfeiffer	Négatif
15.	« « « « « filtrat	«
16.	Sérum de cobaye normal	Négatif
17.	« « « «	«

En résumé: avec le sérum de convalescent la réaction était positive 5 fois sur 7; avec le sérum de cobaie inoculé avec du sang, 1 fois sur 4; elle ne fut essayée qu'une fois avec du sérum de singe inoculé avec une émulsion de bacille de PFEIFFER et une fois avec du sérum de singe inoculé avec du filtrats de crachat de grippé et fut négative dans les deux cas. Le sérum normal de boeuf et de cobaye donnerent des résultats négatifs aussi.

Discussion.

Nous considérons les expériences et observations que nous venons de décrire amplement suffisantes pour établir la filtrabilité du *virus* de la grippe et son pouvoir de produire la maladie expérimentalement chez les animaux de laboratoire.

Le critérium adopté par nous est le même que celui de NICOLLE et LEBAILLY, c'est à dire la réaction thermique qui survient à la suite de l'inoculation. La légitimité de ce critérium peut être mise en doute par quelques auteurs qui pourront objecter que l'hyperthérmie peut être due à l'action toxique des substances inoculées ou même résulter tout simplement d'une variation accidentelle de la température de l'animal en observation, sans signification pathologique. Ayant songé à ces deux objections, nous nous efforçâmes dès le début de nos recherches à trouver un déterminisme expérimental qui les écarterait. Les précautions prises consistaient en une observation très soignée de la témpérature des animaux en étude, surtout des singes, suivie d'une interprétation rationelle des courbes thermographiques.

Chez les singes la température ne varie pas seulement selon espèce, mais même selon l'état d'agitation ou de repos de l'individu. Il faut donc que les conditions dans lesquelles la température est prise soient rigoureusement identiques et que l'on ait une courbe thermographique du même animal en état normal. En plus de ce système suivi par nous, nous avons tenu compte de la température d'autres singes normaux qui ne jouèrent que le role de témoins pendant toute la durée des études.

Les singes inoculés avec sang et filtrat de crachat par les méthodes décrites, reagissaient deux jours après l'inoculation par une élévation de température atteignant 2° C., qui persistait pendant quelques jours et disparaissait ensuite après quelques oscillations. L'ensemble de nos observations nous démontra que l'intensité et la durée de ces oscillations ne sont jamais égalées par les variations normales ou accidentelles.

La présence d'une periode d'incubation, l'immunité conférée par la première inoculation et l'absence de réaction quand les filtrats ont été chauffés ou traités par l'acide phénique montrent qu'il ne s'agit pas d'une fièvre toxique mais d'une hyperthermie produite par un agent vivant.

Les expériences d'inoculation de sang filtré ou nature, ainsi que celles d'inoculation de filtrats de crachat, donnèrent parfois des résultats négatifs; mais ils ne peuvent pas réfuter la conclusion à laquelle nous avons été menés, c'est-à-dire que la grippe est produite par un virus filtrable qui peut provoquer des réactions chez les animaux de laboratoire. Voyons pourquoi c'est ainsi.

Si quelques filtrats employés n'étaient pas virulents, ce fait est certainement dû à la retention des germes par les bougies, déjà demontrée pour d'autres germes qui les traversent dans la plupart des cas et néanmoins sont quelque fois retenus, enduisant les inexpérimentés en erreur. Cette retention peut être due a des conditions accidentelles des substances filtrées. Quant il s'agit de la filtration des solutions de crachat, dont la composition et la concentration sont variables et qui peuvent être plus ou moins riches en albumine et autres substances qui influent sur le degré de filtrabilité, elle est encore plus comprehensible.

Ce n'est donc pas étrange que quelques uns des crachats filtrés de grippés provoquent des réactions, tandis que d'autres n'ont aucun effet. Il y a en plus la possibilité de la disparition du *virus* avant la filtration.

L'absence de réaction chez les animaux inoculés avec du sang nature a été aussi constatée par NICOLLE et LEBAILLY et ne signifie pas que le sang ne contient jamais le virus; il existe dans le sang pendant une courte période pendant laquelle celui-ci est infectieux et a des propriétés curatives. Cette période une fois passée, toute inoculation de sang reste sans effet, parce que le *virus* s'est localisé dans d'autres parties du corps du malade ou en est même déjà disparu.

Il nous semble que les résultéts, obtenus par nous au moyen de l'autohémothérapie et de la vaccinothérapie par filtrats, confirme notre intérpretation, puisqu'ils sonplus efficaces pendant les premiers jours de fièvre, qui correspondent probablement à unt phase de septicémie. Cette opinion est partagée por VIOLLE, qui l'exprime en parlant des résultats positifs de ses expériences d'inoculation de sang en nature et de sang filtré.

Le grand nombre de résultats positifs de la précipitation entre filtrats de crachat et sérum de convalescents est aussi en faveur de notre opinion.

Nous n'entrerons pas dans le détail des travaux sur l'étiologie de la grippe faits pade nombreaux auteurs à un point de vue purrement bactériologique. Nous devons pourant citer ceux qui traitent de l'existence d'un virus filtrable et de sa transmissibilité expérimentale, c'est-a-dire NICOLLE, LEBAILLY et VIOLLE en France, SELTER et Mc. KEEGAN aux États Unis et ARAGÃO au Brésil. Nous avons déja cité maintes fois les trois premiers, qui, l'exception de SELTER ont été seuls à obtenir des résultats positifs. Nos conclusions sont en accord avec les leurs.

Mc. KEEGAN se croit autorisé, à la suite d'un petit nombre d'expériences, à déclarer qu'il ne s'agit pas d'un *virus* filtrable. ARAGÃO dans son article publié dans Brazil Medico (vol. 32. n. 45. p. 253) déclare n'avoir eu que des résultats négatifs aux expériences d'inoculation de substances de la gorge de grippés: il dit que la réaction est insignificante, quand on inocule dans le larynx, et que les animaux périssent d'affections secondaires quand on les introduit par une autre voie. ARAGÃO ne dit pas qu'il a fait des filtrats et qu'il les a inoculés et ne cite aucune inoculation de sang. Ses resultats négatifs ne peuvent donc comme il est d'ailleurs le premier a le reconnâitre, être considérés définitifs.

Conclusions.

1. La grippe est une maladie infectieuse produite par un *virus* filtrable.
2. Ce *virus* existe dans le sang des grippés pendant certaines phases de la maladie.
3. Le *virus* se trouve dans le crachat des grippés.
4. Le sang et le crachat des grippés conservent généralement leur virulence après filtration sur bougie; quand il y a perte de virulence, elle est due à la propriété de retention des bougies, déjà constatée pour d'autres germes filtrables.
5. Le *virus*, tant du sang comme du crachat, peut provoquer des réactions chez differentes espèces d'animaux, avant ou après filtration; la réaction prend la forme d'une hyperthérmie intense et prolongée et survient après une période d'incubation.
6. Les filtrats virulents chauffés et phéniqués semblent avoir des propriétés curatives.
7. L'autohémothérapie est souvent efficace; son efficacité doit dépendre de l'existence du *virus* dans le sang.
8. Un singe fut immunisé par une première inoculation de crachat filtré et ne réagit plus lors d'une deuxième, faite après un certain délai.
9. La réaction de précipitation entre filtrat de crachat de grippé et sérum de convalescent (homme) est souvent positive.
10. La réaction de fixation entre sérum humain et filtrat est négative.

Explication des Courbes.

(Voir le texte portugais. p. 174 à 191).

Les croix indiquent les dates des injections ou inoculations.

Courbe n. I. 1re expérience. Singe du genre (*Cebus*); inoculation de sang.

Courbe n. II. 2me expérience. Cobaye; inoculation de sang. Réaction faible.

Courbe n. III. 3me Expérience. Cobaye; inoculation de sang. Réaction intense.

Courbe n. IV. 3me expérience. Cobaye; inoculation de sang. Réaction intense.

Courbe n. V. 3me expérience. Cobaye; inoculation de sang. Réaction intense.

Courbe n. VI. 3me expérience. Cobaie; inoculation de sang. Réaction intense.

Courbe n. VII. 7me expérience. Singe; inoculation pharyngienne de crachat nature. Réaction intense, courbe tres irregulière.

Courbe n. VIII. 8me expérience. Singe (*Ateles*); inoculation de filtrat de crachat. Réaction intense.

Courbe n. IX. 9me expérience Singe *(Cebus)*; inoculation de filtrat de crachat. Réaction intense.

Courbe n. X. 10me expérience Singe *(Cebus)*; inoculation de filtrat de de crachat. Réaction intense.

Courbe n. XI. 11me expérience. Cobaye; inoculation de 5cc. de crachat filtré. Réaction faible.

Courbe n. XII. 1re Observation vaccinothérapique par filtrat de crachat. Résultat negatif.

Courbe n. XIII. 2me Observation vaccinothérapique par filtrat de crachat. Résultat favorable.

Courbe n. XIV. 3me Observation vaccinothérapique par filtrat de crachat. Résultat favorable.

Courbe n. XV. 4me Observation vaccinothérapique par filtrat de crachat. Résultat favorable.

Courbe n. XVI. 5me Observation vaccinothérapique par filtrat de crachat. Résultat favorable.

Courbe n. XVII. 6me Observation vaccinothérapique par filtrat da crachat. Résultat favorable.

Contribution à l'étude des Protozoaires du Brésil

par le Dr.

ARISTIDES MARQUES DA CUNHA

(Assistant à l'Institut Oswaldo Cruz).

Cette note comprend les résultats de nos recherches sur les Protozoaires d'eau douce de l'état de Rio Grande do Sul.

Les échantillons furent pris dans des flaques d'eau stagnante aux environs de Porto Alegre ou proviennent du plankton des grands cours d'eau de Rio Grande.

Nous avons déterminé 106 espèces, dont quelques unes pas encore signalées au Brésil. Elles représentent les différents groupes de Protozoaires.

Suit l'énumération des espèces trouvées:

Amoeba proteus (ROESEL, 1755).
Amoeba limax DUJ., 1841.
Arcella vulgaris EHRB., 1830.
Arcella dentada EHRB, 1830.
Arcella discoides EHRB., 1843.
Arcella costata EHRB., 1847.
Difflugia oblonga EHRB., 1831.
Difflugia corona WALLICH, 1864.
Difflugia tuberculata WALLICH, 1864.
Difflugia urceolata CASTER, 1864.
Difflugia elegans PENARD, 1890.
Difflugia mamillaris PENARD, 1893.
Difflugia gramen PENARD, 1902.
Centropyxis aculeata EHRB., 1830.
Lecquerensia spiralis (EHRB., 1840).
Euglypha alveolata DUJ., 1841.
Trinema enchelys (EHRB. 1818).
Actinosphoerium eichorni (EHRB., 1840.
Anthophysa vegetans, O. F. MULLER, 1768).
Rhipidodendron splendidum STEIN, 1878
Trepomonas rotans KLEBS, 1892.
Euglena acus (O. F. MULLER, 1786).
Euglena sanguinea EHRB., 1830.
Euglena spirogyra EHRB., 1830.
Euglena deses EHRB. 1833.
Euglena geniculata (DUJ., 1851).
Euglena tripteris (DUJ., 1841).
Euglena oxyuris SCHMARDA, 1846.
Euglena velata KLEBS, 1883.
Euglena fusca KLEBS, 1883.
Crumenula ovum EHRB., 1840.
Crumenula texta DUJ., 1841.
Crumenula fusiformis (CARTER, 1859.
Crumenula steini (LEMM., 1901).
Crumenula piriformis (CUNHA, 1913).
Crumenula mammillata (CUNHA, 1913)
Crumenula truncata CUNHA, 1914.
Phacus pleuronectes (O. F. MUELLER, 1773).
Phacus longicauda (EHRB, 1830).
Phacus pirum (EHRB., 1830).
Phacus triqueter (EHRB., 1833).
Phacus hispidula (EICHWALD, 1847)
Phacus brevicaudata KLEBS, 1883.
Phacus parvula KLEBS, 1883.
Phacus orbicula, (STOKES, 1886).
Trachelomonas volvocina EHRB., 1381.
Trachelomonas armata (EHRB., 1881).

Trachelomonas cylindrica EHRB., 1822.
Trachelomonas hispida (PERTY, 1852).
Trachelomonas hispida var. *cylindrica* KLEBS 1883.
Trachelomonas hispida var. *crenulatocollis* MASKELL, 1886.
Trachelomonas crebea KELLICOT 1887.
Tachelomonas verrucosa STOKES, 1887
Trachelomonas obtusa PALMER, 1905.
Thachelomonas bernardi WOLOSZYNSKA, 1901.
Trachelomonas echinata CUNHA 1913.
Trachelomonas hirta CUNHA 1914.
Trachelomonas aspera CUNHA 1914.
Trachelomonas megalacantha CUNHA, 1914
Trachelomonas volvocinopsis SWIRENKO 1901.
Cryptoglena pigra EHRB., 1832.
Menoidium pellucidum PERTY, 1852.
Menoidium incurvum (FRES., 1850).
Peranema trichophorum (EHRB., 1830).
Anisonema acinus DUJ., 1841,
Sinura uvella EHRB., 1833.
Dinobryon sertularia EHRB,.
Cryptomonas ovata EHRB., 1831.
Chilomonas paramaecium EHRB., 1834.
Polytoma uvella EHRB, 1831.
Gonium pectorale O. F. MUELLER, 1773.
Pandorina morum O. F. MUELLER, 1786.
Eudorina elegans EHRB., 1831.
Gymnodinium viride PENARD, 1891.
Glenodinium cinctum EHRB., 1835.
Urotricha farcta CLAP. e LACH., 1858
Prorodon teres EHRB., 1833.
Coleps hirtus O. F. MUELLER, 1786.
Mesodinium acarus STEIN, 1862.
Lionotus lamella (O. F. MUELLER, 1786).
Llonotus fasciola (O. F. MUELLFR, 1786.
Lionotus folium DUJ., 1841.
Loxodes rostrum (O. F. MUELLER, 1786).
Dileptus anser (O. F. MUELLER, 1785).
Chilodon cullulus (O. F. MUELLER, 1773).
Glaucoma scintillans EHRB., 1830).
Colpidium colpoda (EHRB, 1831).
Colpoda cucullus O. F. MUELLER 1773.
Colpoda steine MAUPAS, 1883.
Frontonia leucas EHRB., 1833.
Frontonia accuminata (EHRB, 1833).
Cinetochium margaritaceum (EHRB. 1831.
Paramoecium cadatum EHRB., 1833.
Urocentrum turbo (O. F. MULLER, 1786.
Lembadium bullinum (O. F. MULLER, 1786).
Cyclidium glaucoma O. F. MUELLER, 1786.
Spirostomum ambiguum EHRB., 1830.
Strombilidium gyrans (STOKES, 1887).
Halteria grandinella (O. F. MUELLER, 1776).
Stichotricha secunda PERTY 1849.
Uroleptus piscis EHRB., 1830.
Stylonychia mytilus (O. F. MUELLER, 1773).
Euplotes patella (O. F. MUELLER, 1773).
Aspidisca costata (DUJ., 1841).
Vorticella citrina O. F. MUELLER, 1773.
Vorticella campanula EHRB., 1831.
Epystilis umbellaris (LINN., 1758).
Epystilis plicatilis EHRB., 1831.

A Contribution to the Study of parasitic Ciliata

by

DR. CESAR FERREIRA PINTO.

(With Plate 76)

Introduction.

While examining the intestine of some frogs (*Leptodactylus ocellatus)* from Manguinhos and other localities of Rio de Janeiro, I found, among other Ciliata and Flagellata, an apparently new species of *Opalina.*

In the blood of the same frogs I found *Trypanosoma rotatorium* GRUBY, which was studied by ASTROGILDO MACHADO and a hemogregarine which I intend to describe in a future paper.

Opalina brasiliensis PINTO, 1918.

(Pl. 76 figs 3a, 10 & 11).

LÉGER and DUBOSQ (Arch. de Zool. Expér. sér. 4, tome 2, p. 343, 1913) divide the genus *Opalina* in two groups, according to the number of nuclei: a) Opalinae with many nuclei and b) Opalinae with from one to five. *O. brasiliensis* PINTO belongs to the latter, since it has from one to four nuclei.

Fresh material.

Unstained specimens of this species have a yellowish colour. The nuclei are visible and the endoplasm contains a great many rounded or rod-shaped granulations. The body moves rapidly and displaces itself forwards or sideways with a certain amount of agility. Cilia are visible on the whole outline.

Morphology and Size.

Opalina brasiliensis is pear-shaped and has a slight elevation to one side of its anterior end, while its posterior extremity ends in a blunt point, which is sometimes also deflected to one side. The specimens I observed were 46 μ long and 22 μ wide. Larger forms may attain a length of 115 μ and a width of from 10 to 12 μ.

Stained Material. Methods.

The specimens were fixed in their natural medium by an alcohol-sublimate solution (Schaudinn) and stained with iron-hematoxylin (Heidenhain).

Structure of the Protoplasm.

The cytoplasm is divided in ectoplasm and endoplasm. The ectoplasm is more or less homogenous and of yellowish colour; many cilia issue from its edge. The endoplasm, which is brown, contains many

rounded or rod-shaped granules which stain deeply when treated with iron-hematoxylin (chromatoid bodies of LÉGER and DUBOSQ).

The lines of cilia are spiral (fig. 3a) and go from one side of the body to the other; they are not smooth as in *O. longa* BEZZENBERGER, but composed of minute granules which stain very well with iron-hematoxylin. They are more or less equidistant and I never saw them fork. In a specimen measuring 22 μ (width) by 48 μ (length), there were twenty four rows. The nuclei, of which there are mostly two, are generally in the middle. (Fig. 3a).

Nuclear Structure.

(Pl. 76 figs. 1, 8, 9, & 9a.)

Quiescent state. The nuclei are more or less rounded; when there is only one, it occupies the middle of the cell; when there are two, they are also near the middle, one behind the other and somewhat obliquely to the longitudinal body-axis. (fig. 3a). The nuclear membrane is clearly visible and sometimes shows slight elevations and depressions.

Like in other species of the same genus, the nucleus of *O. brasiliensis* contains rounded or elongate masses of chromatin, which are generally near the surface of the nuclear membrane. (fig. 1). To the inside of these, there are sometimes other very small achromatic granules (fig. 3 & 3a), or a mass of smooth achromatic substance. (fig. 9 & 9a).

Division of the Nucleus.

The nuclear division of *O. brasiliensis* corresponds more or less to the *paratenomitosis* of ALEXEIEFF (no centrioles).

The first stage is characterised by the stretching of the nucleus, the disappearance of the nuclear membrane and the elongation of the chromatin masses, which either go to the edge or remain in irregular groups in the middle (fig. 2).

After that (fig. 3 and lower nucleus of 3a), there appears a pseudo-centrodesmosis which binds one of the granules on one side to another granule on the opposite side, while the nucleus becomes longer and narrows at its equator (fig. 4); this enables one to perceive the pseudo-centrodesmosis quite clearly.

At a later stage (fig. 5), the equatorial stricture becomes more marked and the pseudo-centrodesmosis is still seen, connecting the chromatin mass on one side to a small granule on the opposite side. Then (fig. 6) half the pseudo-centrodesmosis disappears and the rest of it remains attached to a chromatin mass on one side of the nucleus only. After that, the stricture gets more and more accentuated (fig 7) and the pseudo-centrodesmosis can be seen no longer, but only rounded or elongated chromatin masses are visible; they may be isolated or arranged in loose groups in the vicinity of the membrane.

When the rounded daughter-nuclei are formed, they are still connected by a slender filament (fig. 8). Later on the filament tears and frees them (fig. 9 & 9a.).

I have observed stages of the division of binucleate specimens of *O. brasiliensis* and have seen specimens with four resting nuclei (fig. 11).

Specimens with only one nucleus are generally smuch smaller than the plurinucleate forms, a fact which leads me to believe that they must be younger individuals.

Explanation of Plate 76.

All the figures of plate 76 were drawn from cover-glass preparations, fixed by sublimate - alcohol (Schaudinn) while wet, and stained with iron-hematoxylin (Heidenhain).

Fig. 5 was drawn with compensating eye-piece 6 and immersion lens 1/12; fig. 3 with compensating eye-piece 4 and immersion lens 1/12; the others with eye-piece 2 and lens 1/12. Drawings at the level of the table, with Zeiss microscope and Abbé camera-lucida.

Fig. 1 Resting nucleus. Chromatin masses of different sizes and shapes at the edge of the nuclear membrane. A large oval chromatin granule with a clear halo near the center.

Fig. 2 Elongated nucleus; beginning of mitosis; disappearance of nuclear membrane. Rounded and elongated chromatin masses at the edge of the membrane and inside.

Fig. 3. *Opalina brasiliensis* showing the spiral lines of cilia; they are composed of very small and deeply stained granules. The cilia and the granulations of the endoplasm are not drawn. Lower nucleus and that of fig. 3 show the formation of the pseudo-centrodesmosis between two granules; fig. 3 is more enlarged.

Fig. 4. Later stage of mitosis. Pseudo-centrodesmosis present, going from an oval mass on one side, to another equal one on the opposite side.

Fig. 5 Advanced stage of division. Pseudo-centrodesmosis going from a chromatin granule to a chromatin mass on the opposite side. Deeply stained (Iron-hematoxylin) and irregularly disposed chromatin masses.

Fig. 6. Involution of half the pseudo-centrodesmosis.

Fig. 7. Final stage of mitosis. Very marked stricture. Irregularily and differently shaped chromatin masses.

Fig. 8. Daughter-nuclei, still attached by slender filament.

Fig. 9 & 9a. Free daughter-nuclei at rest. Crescent-shaped or rounded chromatin masses in the vicinity of the membrane.

Fig. 10. *Opalina brasiliensis* with two dividing nuclei.

(The details are not drawn as the specimen was not well differentiated).

Fig. 11. Specimen with 4 nuclei.

Literature

1 ALEXEIEFF, A.	1913	Systématisation de la mitose dite "primitive". Sur la question du centriole. Archiv fuer Protistenkunde. Iena Vol. 29, pp. 344-363.
2 ARAGÃO, Dr. H. de B.		Noticia sobre o *Nyctoterus cordiformes* Stein. Mem. do Instituto Oswaldo Cruz. Rio de Janeiro. Vol. IV, n. I, p. 126.
3 BEZZENBERGER, ERNEST	1904	Uber Infusorien aus asiatischen Anuren. Arch. fuer Protistenkunde. Iena. Vol. 3, pp. 138–174, Pl. XI.
CEPEDE, CASIMIRO	1904	Recherches sur les infusoires astomates. Arch. Zool. exp., vol. 3, pp. 341–609, Pl. IX–XVIII.
4 CHAGAS, Dr. CARLOS	1911	Sobre as variações ciclicas do cariozoma em duas especies de ciliados parazitos. Memorias do Inst. Oswaldo Cruz. Rio de Janeiro, Vol. III, n. 1, pp. 136–144, Pl. 9 and 10.
5 DOFLEIN, Dr. F.	1911	Lehrbuch der Protozoenkunde, pp. 956–58.
6 FONSECA Dr, O. DA	1915	Estudos sobre os flajelados parazitos. Trabalho do Instituto Oswaldo Cruz. Rio.
7 FAURE FREMIET, EM.	1905	La structure intime du protoplasme chez les protozoaires. C. R. Soc. Biol. Paris, Vol. 2, pp. 612-14 and 697–699.
8 HARTMANN, MAX. e CHAGAS, Dr. C.	1910	Estudo sobre flajelados. Mem. do Instituto Oswaldo Cruz, Rio de Janeiro. Vol. II, n. I. pp. 64–124, Pl. 4–9.
9 KENT, W. S.	1881	A Manual of the Infusoria. Vol. III, p. 558.
10 KUNSTLER, J. e GINESTE, Ch.	1905	Les spherules trophoplasmiques des infusoires ciliés C. R. Acad. des Sc., Vol. 141, pp. 907–8.
11 «	1906	L'orientation du corps des Opalines. C. R. Soc. Biol. Vol. 61, p. 113.
12 LEGER ET DUBOSCQ	1904	Notes sur les infusoires endoparasites. Arch. de Zool. Expér. V. II, pp. 337–356, pl. IV.
13 LOEWENTHAL, Dr. W.		Notizen uber *Opalina ranarum* Purkinje et Valentin ; Archiv fuer Protistenkunde, Iena, Vol. 113 p. 115–120.
14 MACHADO, ASTROGILDO	1911	Pesquizas citolojicas sobre o *Trypanosoma rotatorium* Gruby. Mem. do Instituto Oswaldo Cruz Rio de Janeiro. Vol III, n. 1, pp. 108-132, Pl. 7 and 8.
15 METCALF, MAINARD M.	1909	*Opalina*. Archiv fuer Protistenkunde. Iena. Vol. 13, pp. 195-375, pl. XIV-XXVIII.
16 « « «	1914	Notes on Opalina. Zoologischer Anzeiger. Vol. XLIV, n. 12. July the 21st, 1914, pp. 533-541.
17 NERESHEIMER, Dr. EUGEN		Die Fortpflanzug der Opalinen. Archiv fuer Protistenkunde, Iena, Suppl. 1 pp 1–43, Pl. 1–3.

18 PINTO, CESAR FERREIRA 1918 Contribuição para o conhecimento dos ciliados parazitos. Brazil – Medico, n. 37, July the 6th, 1918.

A Contribution to the knowledge of Brazilian Oestridae

by

DR. ADOLPHO LUTZ

(With Plates 27-29).

The family *Oestridae* is formed by several genera of which the old genus *Oestrus L.* forms the center. Modern authors prefer the name *Oestrinae*, so as to indicate that these parasitical flies are merely a subfamily of the *Muscidae*. I agree with them, but do not go so far as to place them in other subfamilies, to which they may have certain affinities.

The parasitism of the larva of most genera and species may be considered as their most important general character; but they have other points in common and differ from other, non parasitical, flies by other features.

Were it not so, we should have to include *Mydaea pici* in the *Oestrinae*, a thing which nobody has thought of, as yet.

The *Oestrinae* may be subdivided in tribes, instead of subfamilies. One of these (the former *Cuterebrinae*), is composed of the genera peculiar to America, which are characterised by cutaneous parasitism and also by their large size (wanting only in the rather aberrant genus *Dermatobia)*.

A detailed and well illustrated monograph of the *Oestrinae*, by BRAUER, was published In 1863. A more recent and complete, though much shorter one by ARMINIUS BAU appeared in WYTSMAN's *Genera insectorum*. So we are not absolutely dependent on the original papers which are much scattered and of difficult access, though they ought to be consulted whenever possible. There are a few recent ones by AUSTEN, BRAUER and BERG.

To give a short account of our present knowledge, we may state that the *Oestridae* are oviparous or larviparous *Muscidae*, which (as far as we know) always pass their larval stage in mammals, and live either in the skin, the stomach, or the nasal cavities. They reach them either directly or by more or less complicated migrations. The pupae are not formed in the body of the host, but outside. Generally, the imago does not feed but only lives for the propagation of the species. Its body is large, its head big and partly tumefied; the eyes of both sexes are small and set upell apart. Ocelli are always present.

The antennae occupy a rather deep groove. The palpi are rarely developed, they are mostly atrophied or altogether missing.

The scutum is almost quadrangular; the thorax thick, the abdomen slightly detached and always rather short and stout. There are no macrochaetae. The female may have an ovipositor. There are always fine folds or wrinkles in the wings which are of the ordinary type, found in the *Muscae calypteratae*; the same applies to the legs.

A peculiarity worth mentioning is the great likeness between most of these species and aculeate *Hymenoptera*, in general appearance as well as in the way of flying and buzzing. This explains why many large animals are so afraid of them.

The american *Oestridae* are rather different from those of the old world, though they have some affinity to *Cephenomyia*. The larvae of *Dermatobia* somewhat ressemble those of *Hypoderma*.

Dermatobia hominis is easily distinguished from all other american species, by its small size, the absence of hairs, the brickred eyes (in live specimens), striated scutum, hyaline wings and metallic blue abdomen. It seems to be the only species of this genus, but covers an extensive territory and has a long list of hosts of which cattle, though introduced, is the most important and suffices alone to insure the continuity of this species.

The other brazilian *Oestridae* are rather scarce and rarely seen, though their size, quite uncommon in *Muscidae*, and many peculiarities in their appearance draw the attention of the collector. Of the other genera, *Cuterebra* became known in the first period of systematic dipterology; species of *Rogenhofera* and *Pseudogametes* were also described, though without the later distinction of their genera.

With the help of the above mentioned monographs, I drew up a key for the *Oestrinae* observed by me in Brazil:

1. Under side of the head with deep longitudinal fissure containing the proboscis *(Cuterebra* and other american genera) 4
   The same, without deep fissure *(Oestrinae typicae)*..... 2
2. Transversal apical vein absent; small squamuae *(Gastricolae)* 3
3. Empodia and ocelli distinct..... *Gastrophilus* LEACH
4. Aristae pennate..... 5
   Arista bare..... *Rogenhofera* BRAUER
5. Arista pennate, on the upper side only..... 6
   « « « both sides..... *Pseudogametes* BISCHOF
6. Face with callosities. Tarsi broad..... *Cuterebra* CLARK
   « without callosities. Tarsi slender..... *Dermatobia* MACQUART

Follows a list of South-american species:

1. *Cuterebra ephippium* LATR. 1817 Cayenne.
2. « *apicalis* GUÉR. 1829-38, Brazil.
3. « *patagona* GUÉR, 1829-38. Patagonia.
4. « *analis* MACQ. 1843, Brazil.
5. « *cayennensis* MACQ. 1843, Brazil.
6. « *rufiventris* MACQ, 1853. Brazil.
7. « *megastoma* BRAUER, 1863, South-America.
8. « *funebris* AUSTEN, 1895. Trinidad.
9. « *nigricincta* AUSTEN, 1895. Brazil.

There are also four new species of *Cuterebra*:

10. *Cuterebra sarcophagoides* n. sp. Brazil State of São Paulo.
11. « *nigricans* n. sp. Brazil, State of São Paulo.
12. « *infulata* n. sp. Brazil, State of Rio de Janeiro.
13. « *Schmalzi* n. sp. Brazil, State of Santa Catharina.

14. *Rogenhofera grandis* GUÉR. 1829-38 ? Brazil, Argentina.
15. « *trigonocephala* BR. 1863. Brazil, State of Bahia.
16. « *dasypoda* BR. 1896. Brazil, State of Espirito Santo.
17. *Pseudogametes Hermanni* BR. & BISCH. 1900, Brazil.
18. « *semiater* WIED. 1830. Brazil, State of Rio de Janeiro.
19. *Dermatobia cyaniventris* MACQ. 1843. Brazil.
20. *Gastrophilus asininus* BR. 1863. Brazil (introduced).

Of the species mentioned, *C. analis* MACQ. is the same as *C. apicalis* GUÉR.; this may be readily seen by the good drawing which accompanies this author's description. If the specimen described by LATR. as *ephippium* had lost the hairs on the scutum, the same may apply to it. This form has not been found in Brazil, nor has *patagona* GUÉR. been seen. *C. cayennensis* MACQ. and *funebris* AUST. do not seem to be natives; the first ist not easily distinguished from *apicalis*; the home of *megastoma* BR. is uncertain. Consequently we must consider only the following three species of *Cuterebra* as natives: *C. apicalis* GUÉR., *C. rufiventris* MACQ. and *C. nigrocincta* AUSTEN.

I have no specimens of the two last ones; they must be rare and probably belong to a very limited region as they have apparently not been found since. On the other hand, I have four new species to describe. Adding two species of *Rogenhofera*, two of *Pseudogametes* and one of *Dermatobia* to these, we have twelve native species. There is also a *Gastrophilus* but it is undoubtedly of foreign origin.

I will now proceed to describe the different genera and species, leaving my remarks on their morphology and biology, for the second part of the paper.

Descriptive Part.

I. Genus Cuterebra.

This genus is exclusively american and its many species cover the entire continent. The North-american type is rather different from that of the brazilian species, to which this paper is limited. One of them is relatively common in this country and can be found in many places; the others are rarer and limited to more restricted zones. Much time and many collaborators are needed to collect the necessary material for a study on *Cuterebra*. My collection looks small and yet it is probably the richest in native species. Although it is now many years old, there seems small likelihood of its increasing, so I shall not delay the study of the specimens any longer.

BRAUER gave a very minute description of *Cuterebra*, the most important parts of which may be found in BAU from whom I quote:

"Characters: Head large, generally broader than the thorax, hemispherical, rounded, and convex. Vertex slightly or not at all prominent, flat behind, with well marked edge. Antennal groove excavated, heart-shaped; either single or divided by a central rather prominent ridge.

Antennae aproximate at the base, drooping, the two first segments short, the third short or elongate, oval. Arista at base of the anterior border; upper side pennate. Mouth forming a deep and long fissure on the under side of the head.

Proboscis large, corneous, generally retracted, geniculated at the base, the terminal part compressed and of the same length as the oral fissure.

Under face very much swollen, not excavated under the eyes. There are shining black calli on the head, which are sometimes smooth, sometimes wrinkled. Scutum almost square, or longer than broad.

Wings dark but diaphanous, with transversal apical vein. First posterior marginal cell open. Anal lobes large, mostly darker then the rest of the wing membrane, erect on the side of the scutellum. Squamulae very large.

Legs strong, short and thick. Tarsi broad and flat. Ungues slighly bent, pulvilli rectangular and broad, shorter than the ungues.

Abdomen thick, heart-shaped, inclining to globolar form. Last ring semilunar, with an arched postero-inferior incision in the male which embraces the broad flat, shield-like genital ring; in the female, it has an angular inferior border, forming a triangular or quadrangular fissure enclosing the small semilunar genital segment.

Larvae: Ovoid, thick, with a pair of oral hooks on the cephalic segment.

Antennae nipple-shaped with two chitinous rings, recalling ocelli; anterior stigma forming transversal slits between the cephalic ring and the next one. Body convex above, concave below, with longitudinal furrows. On segments 3—9 three pairs of lateral elevations bearing strong thorns or sharp prickles (BRAUER), or covered with smooth scales (AUSTEN). The last ring of the body is glabrous and may be retracted into the preceeding one thus forming a stigmatic cavity: it is narrower and shorter than the preceeding rings. Posterior stigmata crescent or kidney shaped."

The callosities of the face and some smaller ones on the pleura and the abdomen characterise the genus, but are of little use in distinguishing the species, as their arrangement is the same in all of them. They may vary in size, but also in individuals of the same species, as the tomentum around them is easily rubbed off. Size and shape of the antennae vary somewhat in the different species and may be used for classification.

The pattern of the skin of known arvae and pupae may be used for recognising them as it seems different in the three species in my collection.

Their host may also furnish important data as, unlike *Dermatobia*, all the known species are very specialised in their choice of them.

Alulae and squamulae are large, striking and very characteristic; so are the delicate folds on the wings, though they may be found in some other flies.

Cuterebra apicalis has a red band across its dark eyes, a fact I first noticed in a live female. When the insect dies, the band disappears rapidly and was therefore not known.

I shall now describe the species observed; no key is needed, as those described by me, can be recognised by the illustrations; the other descriptions cannot very well be used, unless they are compared with the types.

1. Cuterebra apicalis GUÉRIN

(Pl. 27, fig. 1; Pl. 29, fig 1 face of ♀; fig. 1a face of ♂.)

This is the most common species and is found more often than all the others together. It may be readily recognised by the illustration, but to avoid confusion with other doubtful or similar species, I add a few words. It is medium-sized; the body of the largest specimen, a male, is 23 mm., the wing 16 mm. long; while the smallest measures are 17 mm. for the body and 14 for the wing, the length of the body varying more than that of the wing. The ground color of both body and wing is chestnut or rusty brown. On the dorsum of the abdomen, it becomes nearly black but keeps its steely blue glint; on the legs it may be dark reddish brown, but never black, though the hairs on them are black; the frontal calli are piceous. The tomentum on the scutum (which in well preserved specimens is thick and velvety) is generally ochraceous and sometimes becomes whitish or reddish-yellow; it varies a little, according to the way in which the light strikes it, as the ground colour is perceived when the tomentum is rather thin. In a specimen from JOINVILLE, the ground is so exceptionally dark that the scutum looks blackish and the scutellum (the ground of which ought to be hidden by the tomentum, in well-preserved specimens) looks almost black. (Perhaps *cayennensis* is only a dark specimen of *apicalis* which is very likely to be found in Cayenne; whether *ephippium* LATR. is synonymous seems more doubtful). The wings have a rather weak blackish yellow ground color which is darker in the female than in the male; the alulae of both sexes are considerably darker than the wings. The eyes

of the female (and probably those of the male) have a diagonal brick-red streak during life. Near the apex of the dorsal ridge, found on the third antennal segment of the female, there is a small but deep pit which is probably a sense organ and is wanting in the other sex.

This species covers a large ground and is found even in Mexico. The larvae live in *Holochilus vulpinus* LICHT. and probably in other american *Muridae*. I have specimens from the states of Espirito Santo, Rio de Janeiro, São Paulo and Santa Catharina.

2. Cuterebra rufiventris MACQUART.

(Dipt. exot. Suite, 3e. Subdiv., p. 21 (178) 1843).

Original description:

"Thorace nigro. Abdomine rufo. (Pl. 2, fig. 4).

Long. 9 *l.* ♂ Face à duvet et poils d'un jaune blanchâtre; une petite tache arrondie, noire, nue, luisante, pointillée de chaque côté des joues, près du bord des yeux; espace concave nu, à reflets blancs. Front mat, à petits poils noirs; un espace antérieur à petits poils jaunâtres; un autre espace, alongé, triangulaire, en avant des ocelles, d'un noir luisant; deux autres espaces arrondis, luisans, à petits poils noirs de chaque côté, au bord des yeux: l'un, fort pointillé, à la hauteur de l'insertion des antennes; l'autre, peu pointillé, un peu plus bas. Antennes d'un orum noirâtre; les deux premiers articles à petits poils jaunâtres; style à moitié antérieure noire, postérieure testacée, ainsi que les cils. Yeux bruns. Thorax d'un noir mat; deux bandes nues un peu grisâtres, peu distinctes au bord antyrieur, ne dypassant pas la suture; côtys et poitrine à duvet jaunâtre; une tache, oblongue de duvet noir en avant de l'insertion des ailes, et un peu de duvet noir en avant de cette tache; ycusson nu et testacy en-dessous. Abdomen couvert d'un ypais duvet; premier segment noir, à bord postyrieur fauve; deuxième et troisième d'un fauve rougeâtre, quatrième d'un fauve jaunâtre. Pieds noirs; cuisses testacées au côty intyrieur; pelottes jaunâtres. Cuillerons bruns, bordvs de testacy. Ailes brunes, noirâtres à la base et au bord extyrieur.

Du Brésil, aux environs de Pará".

Austen believes that the specimen described by MACQUART is a male and gives a long description of a female from Ecuador, from CLARENCE BUCKLEY's collection. I give its dimensions only: Length 23, 5 mm.; width of vertex 3 2/3; of head 9 1/3; of thorax at the base of the wings 9; of abdomen (2d segm.) 11,5 mm. Lenglh of thorax, with scutellum 11,5 mm; (a black and white illustration).

3. Cuterebra nigricincta AUSTEN.

Austen also gives a detailed and illustrated description of a new species, one specimen of which was found by BATES in Pará.

Unless the female be different, the species is easily recognised. Consequently I shall only give its diagnosis and its dimensions:

"♂ Length 19,5 mm,; width of vertex 3 mm.; width of head 8 mm.; width of thorax (at base of the wings) 8 2/3 mm.; width of abdomen (second segment) 10 mm., length of wing 16,5 mm.

Black; dorsum of the thorax, except a small area on the anterior margin, clothed with black pile; central portion of the pleurae also clothed with black pile; abdomen metallic brassy green, shining, thickly clothed with siiky golden-yellow pile, with a conspicuous band of black pile on the posterior margin of the third segment, the base also clothed with black pile."

4. Cuterebra infulata n. sp.

(Pl. 27, fig. 4. Pl. 29, fig. 4 (Face).

In this species, (shown in figure 4) all the lighter parts are covered with reddish yellow hairs. This applies to the face, the lateral edges of scutum and scutellum, where there is a band of long hairs, the whole ventral aspect, the inside of the tibiae and a large

part of the femora, starting from the base. Antennal groove and front soot colored; ocellar tubercule shining black. In scutum and scutellum, the ground is yellowish chestnut or reddish brown and covered with short and scarce hairs. Dorsum of abdomen either black or covered with reddish yellow hairs. Ground of legs almost black. Wings blackish with ferrugineous base. The frontal calli can be seen in Pl. 9, fig. 4.

Total lenght of the somewhat bent body 20, that of the wing 17 mm. It corresponds to the largest specimens of *apicalis* but is a little stouter.

The only specimen was caught in Petropolis on November the 4th, 1909, by Mr. J. G. FOETTERLE.

C. infulata is intermediate between *apicalis* and *Schmalzi*, a good deal smaller than the latter but like it in general appearance and colour of the tomentum.

5. Cuterebra nigricans n. sp.

(Pl. 27 fig. 2; pl. 29 fig. 2 (face))

At first sight, this species is very like *apicalis*, but a careful examination reveals differences. As it has been obtained only once (by raising) it is probably rare and not widely spread. For these reasons I do not consider it identical with *cayennensis*, especially as the legs are not really black. From *apicalis* it differs in the following way; The front is reddish brown, the ocellar tubercule and callosities black, the latter very different from those of *apicalis* (v. fig. 1,1a & 2). Scutum and scutellum black, with sooty hairs; only on the anterior border of the scutum there are silky yellow hairs, forming a crescent while on its sides two lateral striae ot similar hairs are seen; these join at the end of the scutellum. Upper and under side of the abdomen like those of *apicalis*. Legs dark chestnut red with black hairs; under side of the femora lighter. Wings translucid, but much darker than in the male of *apicalis*; alulae nearly black. Abdomen very flat on top; on the scutum three faint striae of darker colour. Length of body 21-22 mm.; length of wing 17 mm.

The only specimen was reared in Porto Martins, State of S. Paulo, from a larva found on a native rat. It was dated 31. III. 08. The empty puparium is like that of *C. apicalis* but very much darker.

6. Cuterebra sarcophagoides n. sp.

(Pl. 27, fig. 5; 29, fig. 5 (face).)

This species was named *sarcophagoides* because both colour and markings remind one of *Sarcophaga;* this likeness is particularly striking in fresh specimens, though they are much bulkier than even the largest *Sarcophagae. C. sarcophagoides* is smaller than the other species of *Cuterebra,* but rather stout; this, and the broad tarsi produce a clumsy appearance. The ventral side is greyish white; this color reaches the upper margin of the antennal pit, and extends over the pleura and even the dorsum abdominis, where it takes the form of broad basal bands, with wide interruptions on the first ring and narrower and fainter ones in the next segments.

Ground of antennal pit, dusted with grey, borders, black in varying extension. Frons grey; ocellar callus, in shape of an acute triangle, reddish in front, black behind; facial calli black; upper ones without a sheen. Scutum and scutellum grey turning to reddish, with central reddish-brown stria and four fainter and interrupted striae on each side; the external follows the margin. They look reddish or blackish, according to the incidence of the light. Legs chestnut red; on the apex of tibiae and tarsi the hairlets are black, on the rest of the tibiae and on the femora whitish. Wings translucid, sepia brown; apex and anterior margin darker, base and veins more reddish; alulae sepia brown: thoracic squamae lighter with pale edge.

Both specimens, probably males, were caught in Jacutinga, in the northwestern part of the state of S. Paulo, at the end of April 1907. They were flying round the trunk of a tree, at a good height from the ground.

The description of *megastoma* BRAUER reminds one of this species, but the illustration in BAU's monograph looks very different.

7. Cuterebra Schmalzi n. sp.

(Pl. 27, fig. 3; Pl. 29, fig. 3 (face).)

Total length over 26 mm; that of wing about 20 mm.

Under side of face and thorax clothed with yellowish white hairs, which extend to the superior edge of the antennary pit and form a narrow band at the edge of the scutum. Front blackish-brown, with a few lighter intervals; ocellar tubercule shining. Ground of scutum grey, turning to reddish brown behind, as also in the scutellum; both without long hairs. In the center, a broad velvety streak of darker color, also passing on to the scutellum without reaching its apex. Each side shows two more stripes, but they are shorter and blurred, specially the inner ones. Between the central and the lateral bands, in the anterior part, a rather broad shining white triangle and other similar but shorter spots, between the lateral stripes. In certain lights the rest of the intermediary space also seems light, though it shows much less distinctly. Dorsum of abdomen thickly clothed with silky, reddish golden hairs. Both specimens have a central crescent shaped spot of dark color in the first ring; its convexity somewhat exceeds the posterior margin. The second and third segments of one specimen have a large, apical, velvety black band, which crosses the whole dorsum and ends in a point at the ventral extremity. In the other specimen, there is only a broad, crescent shaped spot on the apical margin of the second article; its convexity is directed forwards, and, at its broadest (in the median line), it hardly covers half the ring.

Abdomen very thick, convex in two directions.

Legs brown with a tinge of red, black cilia, and a few short yellow hairs, at the base only. Wings pale sepia brown, the basis redder; alulae darker. Thoracic squama large, brown, with lighter edge, and dark rim inside. — The specimen with the dark bands seems to be a male; its eyes are hardly larger, but the antennal pit is narrower, and the last article undimpled. Unfortunately this segment is wanting in the other specimen.

This very conspicuous species, is dedicated to the late entomologist JOÃO SCHMALZ, from Joinville, who collected these and two other specimens. (Note: These have also been offered to our collection.)

II. Genus Rogenhofera.

10. Rogenhofera dasypoda BRAUER.

(Pl. 28, fig. 8.)

BRAUER established the genus *Rogenhofera* in 1863, giving a very detailed description of it in "Verh. d. k. k. zool. bot. Ges." in Vienna, which was reprinted in his monograph. I shall not reproduce it here, but give the translation of another detailed description, which tallies with the characters of the species observed by me. There are three known species. The first described swa *grandis* GUÉR., from *Patagonia*, which was placed amongst the *Cephenomya*, but withdrawn later on by BRAUER. CARLOS BERG thinks it was the same species that he observed near the capital of the Argentine Republic. He considers it a typical *Rogenhofera* and describes both sexes, as well as the larva.

The type is *Rogenhofera trigonophora*, from Bahia; it was described and illustrated by BRAUER, and has apparently not been found again. Later on BRAUER described another species, *R. dasypoda*, from Espirito Santo. The following is a translation of his description:

"Large entirely black species, save for the reddish-yellow arista and shiny brownish tomentum on the lower side of the hind tarsi. The last segments bear a few yellow hairs. Vertex half the width of head (about 3 mm.), clothed to the margin with short black hairs; *genae* shiny, almost bare from the level of the base of the antennae; at the

edge of the eyes and below it, clothed more densely with black hairs. Distinct ocellar area with three yellowish ocelli, almost bare and prolonged to the fissure of the ptilinum in a bare longitudinal line. Antennal groove, bare, shiny, with distinct keel. Vibrissal ridge with dense tufts almost forming a moustache, at the slightly prominent edge of the mouth. Lunula excavated, antennae short, the second article only a little longer than the first, the three together forming a curve with internal concavity. Arista bare, rather long and slender, with elongate thickening limited to the base: the second article short. Cheeks broad, shining with few scattered hairs, of the same height as the eyes, with longer hairs only at the posterior margin. Rudiment of proboscis distinctly black and hairy.

Wings longer than the abdomen and covering it in repose; entirely blue black, but for the anterior margin at the apex, from the ends of the second and third vein and along the apical transverse vein where it is brownish hyaline. Alulae rather large, blue black; squamae brown black; halteres black, small trasverse vein oblique, anterior to the end of the auxiliary vein. Apical transverse vein first forming a right angle at the bend, afterwards nearly straight, the bend with a fold but without an appendix. Legs strong, tibiae somewhat bent and base of the hind femora somewhat thickened, with short and dense pile; only the base of the hind femora with dense tufts of longer hairs and on the hind tibiae a brush of longer hairs which occupies the whole dorsal side, excepting the basal fourth. The last four tarsi somewhat dilated, chiefly the 1st and 2d pair; the first tarsus of hindlegs nearly twice as long as the second. Ungues and pulvilli large and strong. Abdomen with dense black pile, the apical edges of the segments with more scattered hairs, very shiny; the shiny part extends the middle, so as to form a longitudinal design, but des not show the triangles seen in *C. trigonophora*. The hypopygium small and depressed, shut in a circular pit in front of the sharp edge of the preceeding segment; it seems formed by two or more telescoped rings, which may be somewhat extruded downwards or slightly forwards (♀) and be enclosed by the rim of the fourth ring. Looking at the head from below, one sees the groove of the proboscis, beginning behind the angle of the vibrissae, as a furrow, enlarged backwards so as to form a deep oval pit, in the middle of which the rudimentary proboscis sticks out. . . No palpi are found.

Length of body 18 mm, including the folded wings 22 mm.

Length of wing 16 mm.

Espirito Santo, Brazil.

The specimen shown in the figure was caught on Dec. Ist 1908 by Mr. FOETTERLE in Petropolis. It is undoubtedly *R. dasypoda* BRAUER.

11. Rogenhofera trigonophora BRAUER.

(Verh. der K. K. zool- bot. Ges.-Vienna 1863).

I only give the dimensions and a translation of the diagnosis from BRAUER's description:

"Diagnose: R. atra; holosericea, thorace supra atro, ad suturam pilis aureis parum piloso; abdomine atro, linea dorsali triangulis nudis, lucidis; segmentorum marginibus pilis aureis cingulatis; alis nigro-fuscis, violaceo-micantibus.

Width of vertex 3 mm.; width of head 7 mm., length of body 17 mm., length of wing 14 mm. Habitat: Bahia, Brazil. Received from my friend A. Rogenhofer".

(Note: I have since received 4 specimens, collected by Mr. J. ZIKÁN in Passa Quatro, Minas. They agree with in BRAUER's description, but in his drawing the golden hairs are rather too striking.)

III. Genus Pseudogametes BISCHOF.

The following extract from *"Anzeiger der Kais. Akademie der Wissenschaften, Mathem. Naturw. Abth., Jhrg. XXXVII. Wien 1900"*. refers to this genus:

Prof. F. BRAUER, presents the following

communication by JOSEPH BISCHOF, medical student: "Preliminary characterisation of some genera of Muscaria."

I give only the passage which refers to Pseudogametes:

"*Pseudogametes* n. gen. It differs from *Cuterebra* by its arista which is pennate on both sides and also from *Rogenhofera* BRAU. and *Bogeria* AUST., which have bare aristae.

Type: *Hermanni* n. sp.; ♂ from Minas Geraes. Length 16,8 mm.

It is in every way so like *Rogenhofera dasypoda* that it might be taken for the male of this species."

At another meeting (N. XV. page 155.) F. BRAUER presents another notice by the same author under the title: Some new genera of Muscidae. (This does not seem to have been printed.)

The types of these genera are in the Hofmuseum in Vienna; *Pseudogametes* was sent by Prof. HERMANN in Erlangen.

I give the following description of the genus which is based on a study of the two known species:

Large, stout and very hairy flies, with thick and broad, ciliated legs. Head and abdomen depressed, so that the axis of the body seems curved when seen from the side. The facial profile is not convex, but the margins of the antennary pit, especially the lower one, are very prominent. The hairy front protrudes between the eyes, when it is looked at from above; the rest of the face forms a continous callosity covered with long but isolated hairs; *genae* and *malae* separated by a gutter like depression. The whole body especially the very prominent scutellum is clothed with long non ramified hairs. Wings dark, with large lobules and open apical cell; angle of transversal apical vein sometimes with short appendix ending in a fold of the membrane; the fifth vein very often reaches the margin, but the piece outside the transversal vein is very much reduced and sometimes very difficult to see, only the base being distinct. Antennal groove very excavated, median ridge obliterated, the ground in its upper part slightly dusty, for the rest shining, sometimes a little wrinkled. Third antennal article undimpled, much longer than the other two together, closely applied, whereas the pennate arista is salient, with more outstanding upper hairs. Eyes small, but very convex; in the female they are of the same size but set wider apart. This genus differs from *Rogenhofera*, not only by the arista but also by the shape of the antennary pit and the head.

12. Pseudogametes Hermanni, Bischof, 1900.

(Pl. 28, fig. 7).

I have two specimens of this species; their size and uniformly black color, agree with BISCHOF's indications. (The rest of the characters can be taken from the description of the genus.) They were caught in the North-West of São Paulo, on a tree, at a good height from the ground, and evidently have habits very similar to those of the following species:

13. Pseudogametes semiater WIED.

(Musca semiatra WIED.)

We give the original diagnosis and an english translation of the description:

"Capite, thoraceque atris, scutello abdominisque tergo rufis; antennis sub fronte semioccultis. – 7*l*. From Brazil.

"Head deep, black, frons large, protruding in front above the antennae, so as to half-hide them, shining at the sides. Under face very much depressed below the anntenae, the anterior edge sloping considerably, the sides clothed with black hairs. Ground color and hairs of thorax deep black; scutellum thickely clothed with long reddish-yellow hairs. Dorsum of abdomen with thick reddish-yellow pile; venter deep black. Wings blackish-brown, venation as in Musca. Squamae blackish brown. Legs black. Obtained from Dr. LUND".

Though WIEDEMANN hinted that this fly belonged to some new genus, he did not connect it with *Trypoderma* (*Cuterebra)* or other Oestrinae. His specimen, pro-

bably a male, seems to be the only one in dipterological collections; it may have been gathered by Dr. LUND near Rio de Janeiro, where he was in 1826. This species seems to be rare, as my now numerous specimens took many years to collect and were all found in the same place, except one male from Alegre in Espirito Santo.

WIEDEMANN's description leaves no room for doubt about the identity of my specimens nor does it call for further particulars. The rarely seen females are larger, with broader abdomen, darker wings and the colored hairs less reddish and more yellow.

This species is well illustrated in one of the plates accompanying our article.

It was discovered in Petropolis by Mr. FOETTERLE, who makes a special study of Lepidoptera. Over a hundred specimens, almost all males, were collected in severalyears; with only two or three exceptions, they all occupied the same small section of the trunk ot the same tree, 3-4 meters from the ground. They were found in the summer months only and chiefly in February. The first appeared almost exactly at 9 o'clock in the morning; they settled on the bark remaining there for hours on stretch and were almost always solitary, never in large numbers.

The whole aspect of the voluminous body of *Pseudogametes* is so like that of the american *Oestrinae*, specially of *Rogenhofera* that most dipterologists who examined them did not hesitate to consider them as such. Only WIEDEMANN, who hardly knew this group, used the word *Musca*, while TOWNSEND considers it allied to *Mesembrina*. Though it is hardly likely that *P. semiater* is a parasite of Vertebrates, I believe, that, for the time being at any rate, it should be classed with the *Oestrinae* of which it may be a more primitive form, likely to supply interesting philogenetic indications.

IV. Genus Dermatobia.

Dermatobia was separated from *Cuterebra* by BRAUER in 1860. The former seems to consist of only one species which for the sake of priority ought to be called D. *hominis* (SAY), though *cyaniventris* (MACQ. 1843) and *noxialis* (GOUDOT 1845) are better known names. I will only make a few remarks about it as it has already supplied enough matter for publication. The drawings contained in them are not quite satisfactory, therefore I also give a new one.

The specific characteristics coincide with the generic ones; I give a synopsis of the most evident. "Size small as in *Calliphora*. Wings hyaline, with slightly developed lobules. Legs slender and bare with less broad tarsi. Scutum not metallic, striated. Abdomen bare, metallic blue".

BRAUER gives a very minutions description of this genus and BAU a more condensed version of it. Follows a translation of the latter, with a few additions of my own in brackets:" Head broader than thorax, hemispherical. Eves small. Frons broad, forming a conical protuberance. Antennal groove deep, elongatedly oval; dividing ridge rudimentary. Antennae touching each other at their base, drooping. First and second articles short, the third more than twice the length of the first two, ridge-shaped (sub-cylindrical, with dorsal ridge); at the base it broadens backwards, being narrower at the apex. Arista (springing from the ridge), outstanding in a latero-horizontal direction, pennate on dorsal side. Mouth opening rather wide. Proboscis retracted. Under face somewhat vesicular. Scutum almost square.

Legs delicate, slender. Tarsi slight, not flattened. Ungues slender, somewhat longer than the empodia. Wings rather long, with elongated hemispherical lobule. Transversal apical vein present; first posterior marginal cell open. Fourth longitudinal vein without appendix, squamae large. Abdomen heart-shaped, flat, sharpened at the rear. Dorsal tergites folded under, metallic; abdominal ones small, lustreless."

Dermatobia cyaniventris MACQUART.

Say's description is unknown to me. MACQUART's is as follows; "*Cuterebra cyaniventris* NOB.

Long. 5,5*l* ♀. Face jaune. Front noir à duvet grisâtre et base testacée. Antennes jaunes; troisième article quatre fois aussi long que le deuxième; style ne paraissant cilié qu'en dessus. Thorax d'un noir bleuâtre, à léger duvet gris et poils noirs serrés. Abdomen déprimé, d'un beau bleu métallique, un peu violet. Pieds d'un fauve clair. Cuillerons et ailes un peu brunâtres.

Du Brésil. Muséum.

In his important monograph GOUDOT gives a slightly more detailed description;

"Longueur 17 mm; antennes jaunes, le premier article ayant à son extremité une petite houppe de poils noirs courts, le troisième à lui seul au moins aussi long que les deux autres, le style un peu brun, n'ayant de cils qu'en dessus. yeux bruns avec une bande noirâtre au milieux; front avancé obtus, brun, à poils noirâtres; à face et cavité frontale fauves, couvertes de petits poils formant duvet, qui font paraître ces parties d'un blanc soyeux; thorax brun nuancé de bleuâtre, tacheté de gris et noir formant des zones longitudinales, couvert de poils très courts noirs. écusson comme le thorax; abdomen chagriné, d'un beau bleu couvert de très petits poils noirs, avec son premier anneau et le bord antérieur du second d'un blanc sale, ayant des poils de la même couleur; pattes fauves, à poils fauves; ailes brunes. Individu mâle.

Habitation; la Nouvelle-Grenade".

The eyes of living specimens are brick red and show no pattern. The ground color varies a little on face and legs; for the rest our specimens agree with the descriptions and are undoubtedly of the same kind.

We will not describe the larvae, which vary a good deal from one stage to another. On this acount I suppressed the parts dealing with them (and with the pupae), in the foregoing descriptions.

The scutum is not properly described. The pattern on it varies with the incidence of light (as in Sarcophagae), and in old specimens is often obliterated. Our illustration gives a good idea of its most common aspect.

I have examined a great many specimens, from different states, without finding any specific differences.

To the already long list of hosts of *Dermatobia* may be added *Grison vitatus*, in which Dr. TRAVASSOS found a larva afterwards examined by me.

V. Genus Gastrophilus LEACH.

The larvae of the genus *Gastrophilus* live in the stomach of *Equidae* and are easily carried to distant countries. I, for instance, have found a species, which attacks horses on the island of Oahu (Hawai) where horses were unknown before the advent of the white race. Another instance is the finding of a fly I determined here (shown in fig. 9) which had hitherto been only known from the North of Africa. I was told that a similar fly was found in Maranhão, but was unable to obtain a specimen. Up to now, I have not heard of other observations of imported *Oestrinae* in Brazil, but a kind of *Rhinoestrus* attacking sheep has been introduced to the River-Plate and may already have found its way to this country.

BRAUER gives very full descriptions of the genus and its species. I will only reprint the indications which are useful for the determination of the genus and the species *G. equi* and *asininus*.

Gastrophilus LEACH.

Wings without transversal apical vein, the fourth ending at the posterior margin.

Abdomen sessile; antennary arista bare, squamae small, generally with long cilia, not covering the halteres; mouth-parts very small; palpi small, spherical, well inside the small oral depression; proboscis attached to the membrane that covers the oral depression, not extensible".

Gastrophilus equi FABR.

Transversal posterior vein always present and placed immediately behind the small one. Wings hyaline, with smoke-colored transversal band in the middle, and either an

elongated spot or two smoky dots, at the point. The female has a rather long, stout, downward bent ovipositor. Trochanters, with a long and bent hook on the under side, in the male; with a tubercule, in the female; both with a corresponding notch on the under side of the femora. Abdomen brownish-yellow, variegated. Lenght of body 13-16 mm. Testaceous species, with brown spots and greyish yellow hairs; thorax with interrupted belt of black hairs, behind the suture; more rarely with reddish hairs only".

Gastrophilus asininus BRAUER
(Pl. 28, fig 9.)

Speaking of two flies bred by BILHARZ in Egypt, from larvae expelled by a donkey, BRAUER says:

"Their general aspect is very different from all my specimens of *C. equi* and after examining them, both Mr. WINNERTZ and Prof. WESTWOOD thought they might belong to a new species. They differ from *G. equi* in the following things: the hairs on the scutum are uniformely reddish brown; the abdomen is almost free from spots; the wings are much wider and have a brown streak which is much broader in the middle than at the posterior margin; the brown color extends to the back of the fifth longitudinal vein. A very similar specimen from Nubia is to be found in WINTHEM's. collection. . . Should the african specimens prove te belong to another species, closely allied to *G. equi*, I propose the name of *G. asininus*".

My specimen tallies perfectly with BRAUER's description and is clearly different from the real *G. equi* which I have in my collection. I am sure it is another species and consequently accept the name proposed by BRAUER.

The ovipositor is clearly shown in my specimen, a female which was caught in the south of Minas. It is almost certain that it was introduced by asses, imported for the breeding of mules.

(Note. – Dr. ESPIRIDIÃO QUEIROZ observed the emigration of several larvae from a horse, lately arrived from Europe. They probably belonged to some species of *Gastrophilus*).

On the parasitism of the american Oestrinae.

Dermatobia hominis has been observed in a vast territory aud has a great number of very different hosts. Of these, the ox is nowadays the most important and is in itself quite sufficient to guarantee the active propagation of the species as it seems unable to get rid of et. Dogs used in hunting commonly show the larvae and people not rarely. The horse, on the other hand, is though almost entirely the mules also in a lesser degree. This fact can not be due to a defensive act, which might explained ityin case of a direct transmission, but not in that of an indirect one.

The other kinds of Oestrinae only atack rodents. BRAUER claims to have examined *Cuterebra* larvae found by NATTERER in *Sciurus aestuans* and *Didelphis philander* in Ipanema; the latter must be an exceptional case. These small marsupials mut still less be included among the hosts of *Rogenhofera* though BAU has done so. During 35 years I have not had any confirmation whatever of this assertion and, in the last 10 years, all inquiries in this direction gave negative results.

Even among the rodents, only a few species are attacked, a fact which proves that the *Oestrinae* are very specialised in their choice of hosts. The most affected are the native *Muridae* from which I gathered two kinds of *Cuterebra* and BERG one of *Rogenhofera*. In certain places, especially on the coast, many squirrels *(Sciurus aestuans* vulgo *caxinguelé* or *serelepe*) have been found with larvae differing from those of *C. apicalis* by their darker color, more like that of *C. nigricans*. In North-America the hares are attacked by a species of *Cuterebra* and of *Bogeria*, but *Lepus brasiliensis* seems free from larvae in the skin. It is strange that all the large rodents like the *capivara* (water-hog) the *aguti* end the *paca* seem complety immune; the same probably applies to introduced *Muridae*.

There was not a single infected specimen among the thousands of rats, *Mus decumanus* or *albiventris*, examined while I was director of the bacteriologic Institute of S. Paulo, though there were two infected specimens of *Holochilus vulpinus*, among the very few rats belonging to other species.

Whatever the mode of infection, it seems evident that the larvae can only attack a few, selected species.

The parasitism is well supported though the larvae may attain the size of the hosts head; this may be due to the fact that the parasite is not free in the subcutaneous tissue, but emprisoned in a sac, probably formed by a sebacious gland or another dilated follicle of the derma. As can be seen in *Dermatobia*, the larvae have prickles or rough scales and provoke a sero-purulent secretion on which they live. When the larva is removed, the secretion stops at once, long before the wound is shut. Cellulitis is sometimes observed on the scalp of children, but it is due to abnormal conditions and does not occur in loose skinned animals, which do not try to get rid of the parasite by violent means. I do not think it probable that the *Cuterebra* larvae living in the scrota of North-American squirrels provoke castration. If the testicules have not simply been displaced to the abdomen, it is more likely that they were removed by another male of the same species, as is often the case in domestic rabbits. The development of the cutaneous larvae is slow and, if their parasitism were not well supported, the continuity of the species would be endangered.

The material for a study on the larvae is scant and generally badly preserved, except that of the already rather well known *Dermatobia*, so I will not enter into a discussion of their characteristics.

It is impossible, as yet, to be even sure of the genus to which larvae belong. *Cuterebra*, *Bogeria* and *Rogenhofera* are all cutaneous parasites of Rodents. For *Pseudogametes* it has never been proved and I know of no host of cutaneous larvae in Petropolis, where my specimens were caught. If there were one, it could hardly escape detection, on account of the relative frequency of the species and the large size the larvae must attain, especially as the region of Petropolis is well known.

Sex differences in American Oestrinae. Biological notes.

It is very difficult to determine the sex of dry specimens of our *Oestrinae*. The size and distance betiveen the eyes give no reliable clue, specially whees only one sex is present.

Some have very small antennae, but this does not seem to be a sex character; it is rather due to imperfect distension. (Like the wings, the antennae only develop after the fly has left the puparium and are small and shrivelled at the time of the ecdysis). The females of *C. apicalis* have a dimple in the terminal article of the antennae; this is not found in the male but may also be wanting in other species. In *Pseudogametes semiater*, the female has a bigger abdomen and is althogether larger than the male, but the difference is not always very accentuated in this and in other species.

The ventral sclerites of our *Oestrinae* are quite reduced; the dorsal ones pass on the under side, so that the lateral membranes become ventral. In dried specimens they are retracted, and with them also the posterior extremity of the abdomen, so that the genital appendices are hidden. In recently transformed specimens the abdomen is distended by liquid so that after pressure, or even diretly, the segments, which later on will be retracted, may show plainly.

It is then easy to distinguish the female *Dermatobia*, by its ovipositor, from the male which has a distinct and rather complicated sexual structure of dark chitin. The female also protrudes her ovipositor, when she hovers around animals.

In order to determine the sex of dried specimens, the last ventral segment may be removed, or the contents of the abdomen examined; in the female they consist almost entirely of eggs. By the use of these methods,

I found out that the females of *Cuterebra* and *Pseudogametes* also have an ovipositor, though it is shorter, the males a well formed genital structure. There is a great analogy between their organs and those of the domestic fly. The eggs ere always shaped like bananas and have a lid at one of the extremities. In one female *Dermatobia* I counted over 900 eggs and NEIVA found a mean number of 750-800. TOWNSEND calculated that there are about 10.000 ripe eggs in a species of *Cuterebra* he examined; the eggs are very small in proportion to the size of the animal.

On the whole, there are more female than male specimens of *Dermatobia* and *Cuterebra*, caught. Of *Pseudogametes*, at least of the species *semiater* there are more males than females seen. These Oestrids fly perfectly but are rather lazy and remain seated in the same place for hours. I have seen *Dermatobia* absorb liquids by means of the proboscis. It does not seem to mate in the first days after ecdysis. All our *Oestridae* buzz and a *Cuterebra*, shut in a breeding glass, makes a noise like a *Bombus*.

I have often witnessed the ecdysis ot *Dermatobia* and even had it cinematographed. The fly dislocates the lid at the end of the puparium by violent efforts of the ptilinum which swells to the size of the head and works in andyout with rhythmic motion. By applying pressure, the ptilinum may be extruded even some time after the ecdysis. On leaving the pupa the fly walks briskly; the wings take a little time to dry and fill with air; the rest of the body also requires some time to dry and assume its natural colour and consistance.

As in other diptera, the ecdysis is rarely made in darkness After waiting the necessary time 33-37 days according to NEIVA's and own observation. the ecdysis may be rapidly obtained by exposing the pupa to sunlight after keeping it in a dark place, or even by lifting the lid and breathing on the imago, as BRAUER advises. Unless I am mistaken, the pupa state of a *Cuterebra apicalis* bred by me one, lasted eighty days; for *Rogenhofera grandis* it may amount to forty three days, as observed by Berg.

Dermatobia was raised several times from larvae obtained from animals by SCHMALZ, LUTZ, YOUNG, NEIVA and others. They can be collected after leaving their host, or while they are doing so, or comtemporary larvae may be extracted. I prefer to raise them in saw-dust. They burrow at once and the external covering is formed in a few days by the dessication of the outer skin. They will even metamorphose entirely exposed, if not allowed to get too dry. *Cuterebra* and its allied genera do not seem to offer greater difficulty, if larvae in the last stage (or living hosts which allow one to wait for the ripening of the larvae) are obtainable.

Still have a few words to say on the egg laying of our *Oestridae*; up to now it has not been witnessed, nor have recently laid eggs and larvae been found. It may however be affirmed that they are oviparous; many specimens, some of which have been caught by me while hovering around animals with extended ovipositor, were examined and excluded all doubt on this point. They never contained any larvae in or outside the egg shells. *Dermatobia* is not commonly seen flying in day time, but in the course of some years I got more than a dozen specimens, which were caught on horses together with Tabanids. I myself have seen several specimens flying round horses and once round a person, and picked three live specimens from a very tame black bull; they were noticeable as the brick red colour of their eyes contrasted with the dark skin of the animal. All these specimens contained well developed eggs but no formed larvae.

Accordiing o GONÇALEZ-RINCONES and SURCOUF the eggs are laid on leaves from which they pass to the venter of mosquitos, by adhesion and infect animals stung by them. In the Welcome Institute in London, I saw a specimen of the *Ianthinosoma Lutzi* with a cluster of eggs; as I expected, the seemed to have been deposited on the insect itself. They could not been distinguish-

ed from egg clusters which I had thrice observed on the back of *Anthomyia Heydenii* WIED., sitting on horses, long before the appearance of the paper refered to. I kept a specimen on a pin, but saw no larva emerging and now this specimen has been lost.

On this specimen the eggs were very close together and so small that they might have been laid by another fly of the same kind, but this is not the case. In a fazenda, where Dr. ARAGÃO spends his holydays, il was noticed that spe-cimens of *Dermatobia*, caught near horses, held other small diptera in close embrace between their legs. He showed me this while I was staying at the place. If these eggs really belong to *Dermatobia*, as these observations seem to prove, they must be directly laid on the diptera which absorb blood or sweat, such as the *Anthomyia* caught on horses and cattle by me. They may easily be captured by *Dermatobia* and the eggs deposited by the forward bent ovipositor. This also explains why people in the affected countries attribute larvae in the skin to mosquitos or even to other flies.

I have two other much older observations on the same point to report. One of my collectors told me that once while in the woods he distinctly felt a sting on a part of his skin, from which three days later, I extracted the smallest *Dermatobia* larva I had seen up to then. Another time, I saw a patient suffering from typhoid fever, who had two bernes in the sacrolumbar region. He told me that one, day when his bed was made, a big blue fly was found crushed in it. The back of this hospital in which another case, that of a nurse, was turned toward uncultivated grazing grounds and the windows were constantly open, in spite of a great number of mosquitoes coming in from that side.

In the first case the transmission was probably due to a mosquito, in the second to a fly, which might even have been a *Dermatobia*, carrying the eggs of another one. It is quite evident that if the eggs are laid directly on insects caught on animals, to which they often return, the result is much more likely to be favourable than if the eggs were laid on leaves chiefly visited by insects which do not seek out larger animals.

It would also be necessary to stick the eggs on the leaves by their cephalic end, so that they might fix themselves by the caudal extremitiy on the mosquito. All this is very unlikely and finds no analogy among other known facts.

The statement made by MORALES in Guatemala (that the eggs are laid directly on the insects) is thus confirmed. TOWNSEND also shares this opinion.

Concerning the egg laying of *Cuterebra*, nothing is to be found in the litterature. As TOWNSEND remarks, the large number of eggs is not compatible with their being deposited on the host. Some years ago, I kept a female *Cuterebra* with a very tame white rat, I obtained no eggs and even lost the fly, which was probably eaten by the rat. Another time, I tried to obtain eggs by a rather strong pressure on the abdomen of another female of the same species, but without result. I then shut the fly in a small wire case. Next morning I found the wire netting dotted with many small eggs. They were firmly attached by their base and had already become black. They were observed for some time but no larvae emerged. The cage was exhibited twice but got lost afterwards

Additional observations.

The present paper had been ready for a long time, when I found an opportunity to make some new observations on the egg laying and development of *Dermatobia* and also on the existence of *Oestrus (Rhinoestrus) ovis* in this country. I publish them here so as to complete what I have already said.

On the evening of Sept. 7th 1916, while on a fazenda neaf Juiz de Fora, I saw, by the aid of a field glass, two *Dermatobia* flies siting on calves at the edge of a wood. Soon after, they alighted on the horses of our carriage and were caught. One of them contained a great many eggs. Shortly afterwards,

I saw a fly with a typical egg cluster on the left side of its abdomen. It hovered around the horses and the people and was finaly caught. It proved to be a small male of *Synthesiomyia brasiliana* BR. & BERG. and carried ten eggs stuck on solidly, lid downwards. This fly was put into a small glass tube with a piece of banana, but it died on the morrow.

It was then pinned on a piece of pith of *Fatsia papyrifera* so that the eggs might be observed and brought near the skin of any animal. They were examined every day and breathed upon so as to imitate the conditions found near the skin of a warm blooded animal, or approached to the human skin.

On the 11th the darkening colour, and the more distinct lid of the eggs, indicated the development of the larvae. On the 12th, the fly was examined under low power, after having been breathed npon; an open lid and the head of an emerging larva was seen. It was brought near the skin of my forearm and after some hesitation, passed on to it, where it was observed by a binocular microscope. It moved about rather rapidly without showing any inclination to burrow. The anterior 3/7 ths were densely covered with large and small thorns, the posterior 4/7 ths were bare. It had the typical form of a *Dermatobia* larva already. The fly was then put near to the arm of another person and a second larva emerged, and tried to burrow in the skin. Much later, another larva was induced to pass on to the arm of a third person, but it began to dry up before penetrating.

I then transferred the two first larva to the shaven dorsal skin of a dog, and put the fly in the vicinity of the same; four or five other larvae emerged almost entirely from the eggs and soon passed on to the skin where they remained for some time, being unable to penetrate at once. Some time afterwards they had all disappeared.

This experience tends to prove that the non perspiring skin of the dog has more attraction for the larvae than the human skin in the same condition.

Partly emerged larvae may retire into their eggshells again and their lids close down over them.

Of the two *Dermatobia* I had caught, one died at once; the other one was imprisoned with a fly which it caught several times, failing to deposit eggs on it. It seemed already rather weak and died soon after. I found many rather developed eggs in both of them.

At four o'clock of the same day, I allowed another larva to get on my skin, but it did not burrow; it was remored and used for a microscopic preparation later on.

On the folloving day, at half-past eight a. m. there was still one egg with a larva in it which on being brought near my arm, passed on it at once and moved about for a long time, almost like a geometrid larva, without trying to burrow. These movements were not felt. On dyubling the skin over it, a slight irritation was felt and the larva was seen to burrow in an almost horizontal direction. It took a long time to introduce its first articles and an hour to penetrate up to its last fourth, which remained horizontal and visible from the outside, being only covered by the corneous layer. The penetration of the larva caused a slight caustic pain, unlike that of a sting. When the burrowing was finished, I felt nothing more.

On the next day, there was no alteration in the dogs skin. My arm showed some redness at the point of penetration where the last fourth of the larval skin still appeared; it was apparently empty and suggested a moult. From noon to evening I felt a slight itching.

Next morning, the dog showed no signs of infection. On my arm, was a dry scab at the site of penetration. When this was removed, there appeared an extremely fine orifice, from which a drop of serum could be expressed. Under the microscope the moviments of the posterior end of the larva could be seen but it was retracted when the serum was removed. In the afternoon the same phenomena were even more distinct. After being carefully shaved, the skin of the dog showed several orifices from which serum exsuded; it sometimes con-

tained air bubles. The caudal ends were rather retracted and difficult to perceive.

On the 17th (the next day) there was a very characteristic papule on my arm. I removed the central crust and expressed a drop of serum; in the afternoon it occurred to me to cover the droplet on the arm with a cover glass. A still quite slender and almost colourless breathing tube which showed distinct movements was then projected. The same process enabled me to see the equally slender and colourless posterior end of another larva in the dog.

Next day (on the 18th) I tried to obtain the emergence of the larva which provoked a slight itching, in my arm, by covering it with gelatine and agar. It projected the posterior end but was unable to come out and remained motionless for some time. I then removed it by pressure which somewhat damaged it. Its appearance was almost like that on the first day and there was no sign of a moult. In the morning only one of the larvae was visible in the dog; it looked very much larger.

On the 20th the larvae in the dog showed tracheal openings and very much enlarged posterior ends.

I was able to obtain two eight days old larvae; one whole, the other in fragments. They had moulted and were very much longer; the posterior part especially had grown in every direction. The whole larva, observed for some time, at the temperature of the room, showed no signs of life. It was 7 mm long. The exsudation of the sac, occupied by the larva, was mixed with pus.

On the 22d, another larva was observed, but it was impossible to extract it, even after inicision of the sac. The larva was obtained the next day, by plugging the hole. The part of the body covered with spines was much shorter than the last, very elongated segments The posterior ends of the large tracheae wereyellow. The maggot had attained one centimeter of lenght, thus suggesting that the stouter thorny part must have reached the subcutaneous tissue. The skin of the larva was entire but eviscerated. The viscera were recovered seperately.

A short time after this, our artist caught a fly on a fazenda in the Serra da Bocaina, on which he saw the caracteristic spot due to a cluster of *Dermatobia* eggs. It was an *Anthomyia* which often seeks out man and animals so as to lick their sweat; the species was probably *A. lindigii* SCHINER. The cluster it carried was composed of seventeen eggs, attached to the abdomen near the middle of the left latero-inferior region. It remained alive for a day, dying afterwards. The eggs showed no signs of life; their brownish colour deepened and they shrivelled. On opening them, I found dead larvae, which had probably been unable to reach a suitable host in time. In fact the fly was caught far from a pasture but near running water.I kept the fly and the egg cluster separately.

On the occurrence of Oestrus ovis in Rio de Janeiro and the neighbouring states.

On Sept. the 30th, 1916, I received a fly caught by Mr. A. LUCE in the Rua S. Francisco Xavier, in a suburb of Rio. Recognizing an *Oestridae* and knowing that there were some sheep near the place, I immediately compared it with BRAUER's detailed description of *Oestrus (Rhinoestrus) ovis* and found that it undoubtedly belonged to this species. Later on, I examined two sheep which had died in the same place, showing the symptoms observed in severe cases of *Myiasis oestrina* but found no larvae. The infection was probably brought from a fazenda in the Serra da Bocaina, where animals descended from european stock had shown the same symptoms.

I searched for larvae in the slaughterhouses. At that time none were found in Rio but I obtained some from Petropolis; they had been found in native sheep bought in the neighbourhood. Later on I also received some from Dr. ESPIRIDIÃO QUEIROZ, physician in Tres Corações (Minas).

Rhinoestrus ovis was doubtlessly impor-

ted, and that is by no means unusual. It is commonly found in sheep from the the River Plate and the larvae are well known to the people working at the slaughter houses who however know nothing of the flies.

BRAUER included Brazil in the habitat of *Oestrus ovis*. He was perhaps referring to Rio Grande, as the occurrence in São Paulo and Rio was not noticed before. I had no native specimen in my collection. Nowadays however it must be found in several places. The specimen, caught in Rio proves that this fly is not confined to the cooler mountains, but also invades the tropical regions.

Literature.

The literature up to 1906 can be found in the two following monographs:

BRAUER, FR. — Monographie der Oestriden. Wien 1863.

BAU, ARMINIUS — Diptera, Fam. Muscaridae. subfam. Oestrinae, WYTSMAN Genera Insectorum, Nº. 43 Brussels 1906.

Papers published after this date, or on species mentioned in the present article:

BERG, CARLOS — Entom. Zeit. Stett., Bd 37, p. 268, 1876; Bd. 42 p. 45, 1881. Stettin. – on *Rogenhofera grandis*.

AUSTEN, E. E. — On the specimens of the genus Cutiterebra etc. Annals and Mag. of Nat. Hist.; (6), XV, pp. 337-396, 1895.

Further notes on Cutiterebra. Ibidem Vol. XVI, 1896. (Contains a discussion of the specimens in the Brit. Mus. and descriptions of new genera and species).

Of the extensive bibliography on Dermatobia we only mention:

BLANCHARD, R. — Bulletin de la Soc. Entom. de France, Vol. LXV, 1899, p. 541.

SURCOUF, JACQUES — La transmission du Ver macaque par un moustique. C. R. Ac. Sc. 1913, T. 156, Nº 18, p. 1406.

SAMBON, L. W. — Observations on the life-history of *Dermatobia hominis* etc. Rept. Advis. Commitee, Trop. Dis. Res. Fund for 1914, London 1915. App. p. 119-150.

TOWNSEND, CHARLES — On the reproductive. . . . habits of Cuterebra and Dermatobia. Science, Vol. XLII, N. 1077, p. 252.

(The last three works refer especially to the transmission of the eggs of Dermatobia.)

There are also four brazilian papers on Dermatobia and another on observations made in Joinville. (Brazil)

MAGALHÃES, PEDRO S. — Subsidio ao Estudo das Myiases. Rio de Janeiro 1892.

NEIVA, ARTHUR — Contribuição ao Estudo da *Dermatobia cyaniventris* MACQ. Rio de Janeiro 1908.

Algumas informações sobre o berne. Chacaras e Quintaes, Vol. II, Nº 10, July, 1910.

Informações sobre o berne. Memorias do Inst. O. Cruz T. VI, Fac. III, 1914.

SCHMALZ, J. B. — Zur Lebensweise der brazil. Dasselfl. (*D. cyaniv.*) Insekten Boerse, Jahrg, 18, Nº. 28, p. 220, 1901.

Explanation of Plates 27-29.

(See Vol. IX, n. 1, 1917.)

Plate 27.

Fig. 1 Cuterebra apicalis GUÉRIN
« 2 « nigricans n. sp.
« 3 « Schmalzi n. sp.
« 4 « infulata n. sp.
« 5 « sarcophagoides n. sp.

Plate 28.

Fig. 6 Pseudogametes semiater WIEDEMANN.
« 7 Pseudogametes Hermanni BISCHOF
« 8 Rogenhofera dasypoda BRAUER
Fig. 9 Gastrophilus asininus BRAUER
« 10 Dermatobia hominis SAY.

Plate 29.

Fig. 1 Face of Cuterebra apicalis ♀
« 1a « « « « ♂
« 2 « « « nigricans
« 3 « « « Schmalzi ♀
« 4 « « « infulata
« 5 « « « sarcophagoides
« 6 Abdomen of Dermatobia hominis SAY.
« 7 Abdomen of Gastrophilus asininus BRAUER ♀.